BUS Transportation

JUNE
1956 • 50 CENTS

31ST ANNUAL MAINTENANCE NUMBER

Pars and the Maintenance Man—p. 19
Good Brakes on Steep Hills—p. 22
How Metro Beats the Smoke Problem—p. 25

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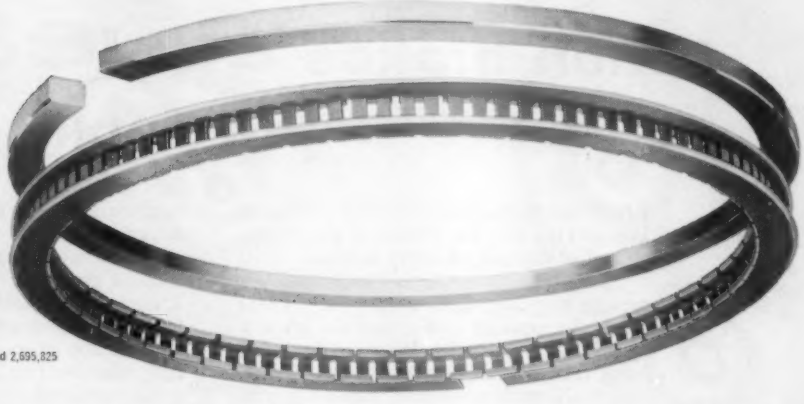

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BUS Transportation

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Soil resistance—A 2-month comparison test without washing shows how Du Pont "Fabrilite" (right) resists soiling that ordinary vinyl upholstery (left) picks up. And "Fabrilite" cleans like new again at the whisk of a damp, soapy sponge.

Flex resistance—Shown by the flexibility test. Du Pont's vibrator test telescopes years of active service into hours, yet after this rugged treatment, "Fabrilite" shows no evidence of cracking or separation from its fabric backing.

Snap-back shape retention—This 2-year service test shows how "Fabrilite" (left) retains its sagless, wrinkle-free appearance compared to ordinary upholstery (right). Easy to work with and comfortable, "Fabrilite" also retains its original fit.

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Lubricants and Fuels
FOR THE BUS INDUSTRY

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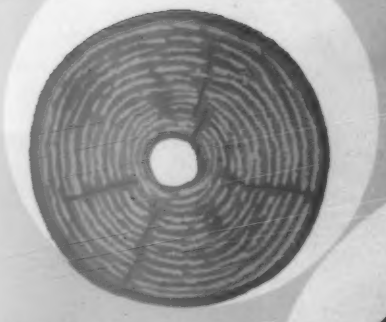

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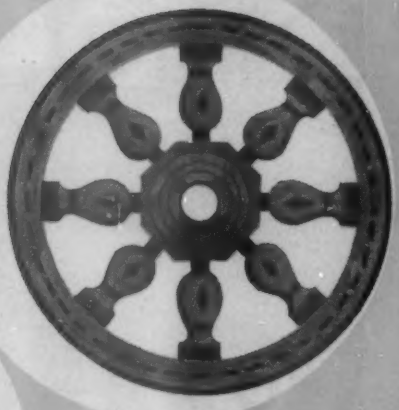

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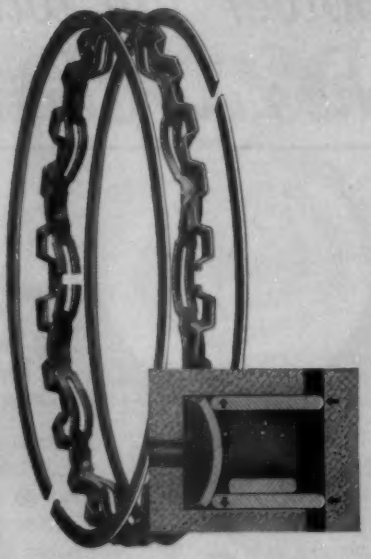
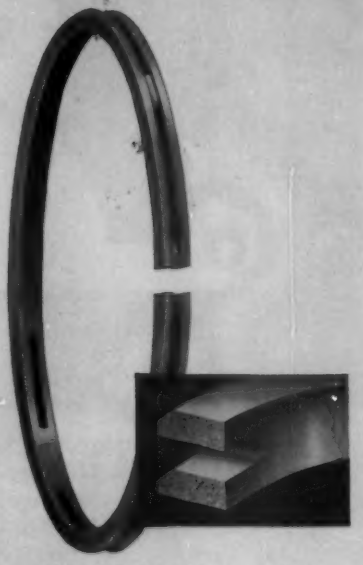


CS-50U for High Vacuum

This new side-sealing oil ring prevents excessive escape of oil around the ring in engines which develop high vacuum on deceleration. Note how the crown of the special Full-Flow Spring holds steel rails snugly against the ring groove so oil cannot pass. Steel spacer of non-clogging design provides excellent oil drainage.



HD-20 for Heavy Duty

This heavy-duty oil ring does a lasting and efficient job in those workhorse truck engines that take terrific punishment day in and day out. The two tapered lands exert a double scraping action that controls oil with amazing efficiency. The narrow cylinder wall contacts mean quick seating, and the wide drain slots drain oil freely.

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STB-4

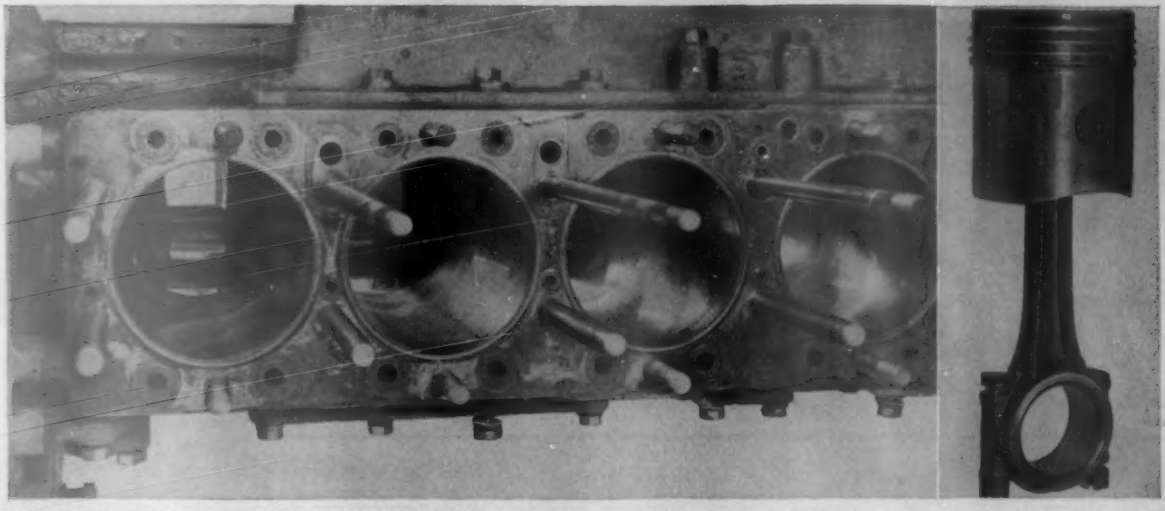
The Engineer's Report

CASE HISTORY

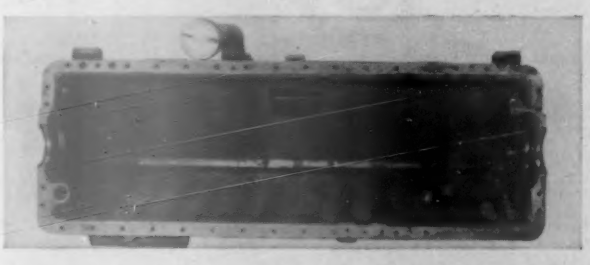
LUBRICANT RPM Delo Oils

FIRM Boise-Winnemucca Stages Inc., Boise, Idaho

Cylinder wear only 0.006" after 228,413 miles!



USING RPM DELO SPECIAL LUBRICATING OIL, this 180-H.P. Fageol engine went 228,413 miles without repairs of any kind, in a bus owned by Boise-Winnemucca Stages, Inc. It ran in intense summer heat and sub-zero winter temperatures on the line's regular route. Wear on cylinders measured only 0.004" to 0.006" and crankshaft journals were still factory standard. All rings were free, all bearings good and pistons showed no varnish. There was no measurable wear on crankshaft or wrist pins.



REMOVED FOR FIRST TIME, oil pan shows no deposits, clean metal is visible after draining. RPM DELO Oils reduce wear and keep engines clean in all of the buses owned by Boise-Winnemucca Stages.

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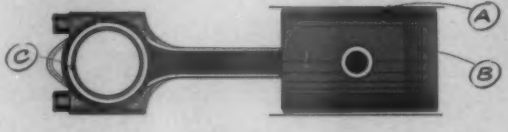
RPM DELO LUBRICATING OILS

How RPM DELO Oils reduce wear, corrosion, oxidation in all heavy-duty engines



A. Contain special additives that provide metal-adhesion qualities...protect parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring sticking. Detergent keeps parts clean...helps prevent piston scuffing.

C. Special compounds stop corrosion of any bearing metal and foaming in crankcase.

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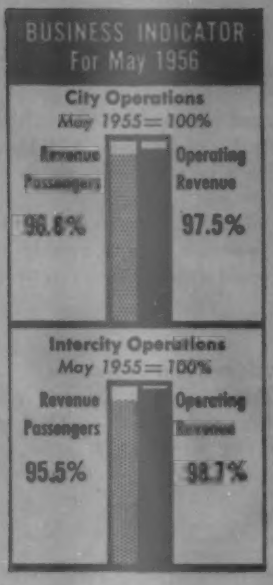
Top Topics

BUS Transportation



The question of taxation for the bus industry in the federal road construction program has now reached the stage where it will be determined by a joint Senate-House conference committee.

The passage of a Senate bill omitting all the exemptions granted to transit in the House bill was a heavy blow to transit, which had won exemption from the one-cent diesel increase on fares below the 35-cent level.

Intercity operators had been pressing for the same exemption on fares of 60 cents or less . . . now, like transit, they must start all over again, as exclusion of the exemption for transit in the Senate bill automatically cancels extension of the exemption to the short haul carriers.

An encouraging note in the Senate bill though, was that the proposed tax of $1.50 per thousand pounds on vehicles weighing more than 26,000 pounds was revised to $2.50 per thousand pounds only on weight in excess of the 26,000-pound mark.

Greyhound is moving its headquarters from Chicago to Niles, Ill.—a small community just outside the Chicago city limits.

In announcing plans to construct a new office building in Niles adjoining the present quarters of Greyhound Motors and Supply Co., President Arthur S. Genet said it was for the sake of efficiency and economy. All Greyhound offices will be on one floor, and will include such modern innovations as a telephonic dictating system with a central stenographic pool.

Completion of the new building is set for late 1957.

Another $52½ million dollars will be spent by the New York City Transit Authority for 450 new subway cars to be used on TA's IRT lines. Bids will be accepted in July and opened in August, with final approval by the Board of Estimate expected in the early fall.

The amount is already included in the capital budget for other improvements to the system, including extension of existing lines and improvements to a number of stations. But because engineering work has progressed slowly on these projects, TA Chairman Charles L. Patterson said, the money could not be spent this year in any event. Its transfer, however, still requires Board of Estimate approval.

The purchase would bring to nearly $143½ million the amount expended on new subway rolling stock. Since Jan., 1955 TA has ordered 200 BMT cars and 400 IRT cars.

Cleveland Transit System's April report showed a net income of $46,966, as compared to a figure of $3,052 for the same month a year ago.

Gross revenues were up too—totalling $2,439,331, a gain of $73,045 over April of last year. Besides the influence of the Rapid, increased charter business is responsible for some of the gains. During the first four months of this year charters brought $62,232 into CTS coffers, as against $36,712 last year.

The 44-day strike of the Red and Tan Bus Lines came to an end this month when the union (Lodge 329 of the Brotherhood of Railroad Trainmen) finally agreed to the principle of arbitration.

The prolonged strike had seriously affected some 40,000 New York City commuters living in northern New Jersey and Rockland County, N. Y., all of whom had to find other ways to travel when some 240 drivers and mechanics walked out on April 23.

A Southeastern Greyhound fare increase has been held up for six months by the Kentucky State Department of Motor Transportation, which asked for further

Continued on next page

information on SEG's earnings and operations.

SEG's net earnings dropped more than 50 per cent in the first three months of this year, leading to the request for a nine per cent increase. But DMT officials still insisted on the six-month delay, in spite of the fact that Greyhound said the information sought could be supplied within two weeks.

Columbus Transit Co. will operate under a "cost-of-service" franchise approved by the Columbus City Council. Effective July 1, the franchise will allow CTC to base its fare on operating profit . . . will give a spread in net return of from 6¾ per cent to 8½ per cent before fares are adjusted.

CTC, subsidiary of the Columbus & Southern Ohio Electric Co., will continue to charge a 15-cent fare. But should fares fall below the prescribed level, they may be hiked to as much as a quarter. If net goes up, fares could conceivably drop to as little as nine cents.

The Canadian Transit Association has a new president in the person of P. G. McAra, superintendent of Saskatchewan's Regina Transit System. McAra was elected to succeed S. E. Preston at the close of CTA's annual meeting in Quebec.

Other officers include W. E. P. Duncan, of Toronto, vice president; J. G. Inglis, of Toronto, treasurer; H. E. King, general manager and J. R. Empringham, general secretary.

Happy 79th birthday to Sam (Mr. S. A.) Jessup, president of Virginia Stages Lines and of 14 other commercial enterprises.

While we don't usually devote Top Topics space to birthday greetings, we know the industry will agree with us that the June 9 birthday of Mr. S. A., one of the great pioneers of our industry, is well worth noting in anybody's book.

Memphis Street Railway Co. is considering express bus service in conjunction with trolley coaches now operating on main thoroughfares.

The new diesel buses—MSR will need 38 of them, at a cost of $1 million if the plan goes into effect—would go express to city limits, where trolley lines terminate, then make all stops in suburban areas.

Express riders would save 16 minutes over trolley coach time . . . would probably pay a premium fare of 25 cents instead of the regular 15-cent fare.

Fifth Avenue Coach Lines' offer to buy the bankrupt Third Avenue Transit Corp. is up for study with the New York Public Service Commission. The plan calls for the outright purchase of Third Avenue for $4,881,090 in cash and another $7,600,000 in stock.

So far the stumbling block seems to be the adjustment bondholders of Third Avenue who have advanced a plan of their own which would give Fifth Avenue 100 per cent of Third avenue reorganized stock (instead of the 37 per cent sought by Fifth Avenue) and who seek 16 shares of Fifth Avenue stock for each $1,000 bond instead of the preferred 12 shares.

A second proposal by the investment banking firm of Allen & Co., now amended to overcome objections by the Securities & Exchange Commission, has been submitted to the PSC along with the Fifth Avenue offer.

A bill being introduced in the Louisiana legislature is meant to give the city of Shreveport control over its public transit system. It's aimed at overcoming a ruling by the state attorney general that the state PSC has no control over Shreveport Railways Co. since it switched from street cars to buses.

C. O. SPARHAWK, right, author of this article, talks with United Transit unit overhaul foreman John Peterson.

UTC Uses Standard Pars as Its Yardstick for Maintenance

How United Transit Co. in Providence, R.I. is trying to meet the transit industry performance measurements for maintenance, running repairs and overhaul

By C. O. Sparhawk • *Vice-President, United Transit Co.*

ALONG WITH SOME 100 other transit properties in various parts of the country, United Transit Co. is participating in a plan to develop a reliable yardstick whereby a management effectively can evaluate the performance of its own property against man-hour measurement standards which have been set up for the industry.

Like "par" for a golf course, which gives the golfer an objective to equal or better, the transit industry performance bogies or "standard pars," as they are termed, give the participants a target to shoot at. The idea was conceived in 1952 and has been undergoing test and minor changes for the past four years. At present about 100 transit companies—all members of the American Transit Association—participate in "standard pars."

Standard pars have worked out reasonably well in measuring such items as platform costs, servicing, transportation supervision, office personnel and some others. These functions are approximately the same for companies of comparable size regardless of where they may be located.

However, in applying "pars" to maintenance, running repairs and overhaul, complications arise from factors such as the make, age and size of vehicles, climate, terrain, type of operation, location and the number of garages needed to properly serve the fleet.

Continued on next page

Servicing Par —
1:00 Man Hour Per Bus Day
(Inaugurated in September)

Bus Days	Man Hours	Man Hours Per Bus Day
6,793	4,048	.60
6,802	3,872	.57
7,065	4,048	.57

United Transit achieved these Pars . . .

M.R.O. Par — 18:00 Man Hours Per 1,000 Miles

	Mileage	Man Hours — Labor	Material	Total	Par
Jan.	830,699	9,814	4,168	13,982	16.83
Feb.	777,127	8,774	3,875	12,449	16.02
March	841,596	10,223	4,026	14,249	16.93
April	798,372	8,963	4,206	13,169	16.49
May	837,225	8,926	3,804	12,730	15.20
June	796,608	8,751	2,976	11,727	14.72
July	782,264	7,121	3,217	10,338	13.22
Aug.	809,218	8,003	3,647	11,650	14.40
Sept.	755,780	8,541	3,840	12,381	16.38
Oct.	821,780	8,548	4,252	12,800	15.59
Nov.	783,599	7,916	3,470	11,386	14.53

A prime difficulty in setting up a universal unit of measurement is the area or location in which the participant operates.

Equipment of companies which operate in warm southern areas is not subjected to winter weather conditions and the subsequent problems which such conditions create and which affect man hour requirements tremendously. Cold weather operation affects battery life adversely due to hard starting. Engine life, too, is reduced materially due to necessity of idling the engines at layover points in cold weather to prevent cooling systems from freezing and to provide comfortable temperature in the body. Clutch life is shortened due to buses getting stuck in deep snow and on heavy grades during and for some time following a snowstorm.

In a storm emergency the mechanical shop force is called on to lend a hand in restoring service on the streets, towing buses out of snowdrifts and getting them operating under their own power. In such circumstances, regular maintenance, of necessity, must be neglected.

The problem of maintaining bus heaters and radiator shutters, automatic sanders and skid chains and the need for changing to lighter viscosity lubricants are other cold climate problems which either do not exist or are greatly minimized in warm areas.

Obviously, the size of fleet, number of vehicle makes and models, age and seating capacity of buses all have a definite bearing on man hour requirements for maintenance, running repairs, and overhaul, abbreviated as "MRO."

It would be inequitable to apply a standard to a fleet of comparatively new buses all of the same make and size and also to apply that same standard to a mixed bus fleet of assorted makes, sizes and ages.

The type of service also has an important bearing. Interurban and transit operations are not comparable regardless of size of fleet or location. One type of service operates at a smart clip with moderate loads over fairly open highways while the other creeps along at slow speed in heavy traffic and with overloads in rush hours.

All of these variables must be considered in attempting to develop a fair and workable "par" for MRO, and the "par" which has been tentatively agreed on by an ATA committee on Standard Pars is 18.00 man hours per 1,000 bus miles. It should be mentioned here that a man hour requirement in excess of 18.00 does not necessarily imply inefficiency nor does a lower figure always point to superior performance.

Again it should be reiterated, the variables which have been mentioned previously have a decided bearing on the resultant man hour requirement.

At Providence we have 66 men, including 19 foremen. Our average hourly rate is $2.08, and our annual fleet mileage is 9,668,249 miles. UTC is fortunate in having a compact operating setup. Administration, operation, maintenance, service and storage are concentrated in a single area, making it possible to conduct our operations on a more intimate basis than is possible where more terminals are needed, with subsequent duplication

"It would be inequitable to apply the same standards

. . . with these conditions

Providence, R. I.

Population
250,000 in metropolitan area

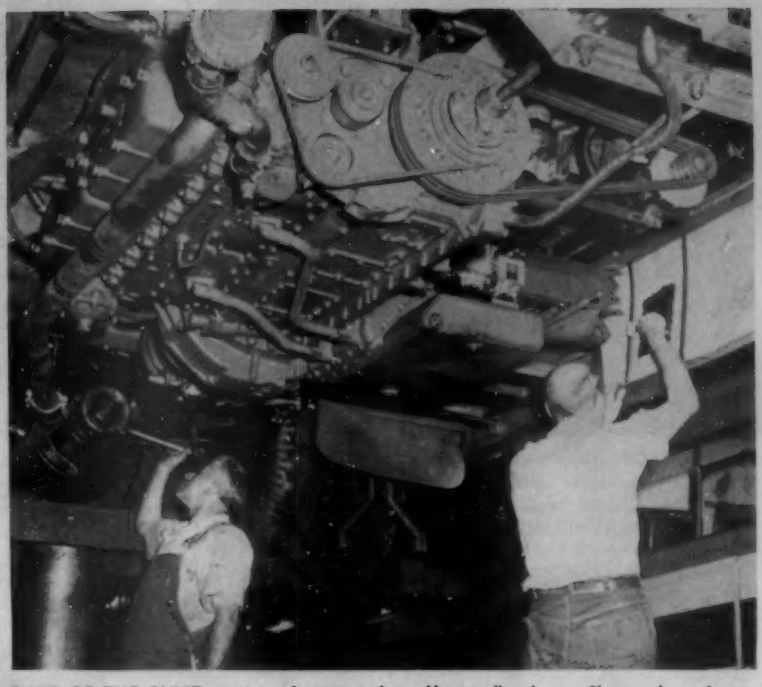
Size
18.91 square miles

Street conditions
Narrow streets, very dense traffic, several bad hills. Pavement condition is just about average

Temperature
In past two years averaged 121 days below freezing

Snowfall
Average annual snowfall is 32.4 inches. In 1955 had 21.8 inches and 56.1 in 1956

Scheduled speed
Average eight stops per mile with a scheduled speed of 10.33 mph



PART OF THE FLEET consists of converted trackless trolley buses. Shown above is one of these undergoing conversion to a Leyland diesel powerplant.

of supervisory personnel.

A word here concerning the UTC fleet. It consists of 304 vehicles of five different makes—99 White, 8 ACF, 82 Twin Coach, 45 GM Coach and 70 Pullman Standard—and 8 different types. Newest vehicles in the fleet are 45 GM diesels which are two years and three months old; oldest are 47 Twin Coaches which are over 14 years old. Average age of the fleet is 120 months, average miles per vehicle is 356,430 and average seating capacity 44.38 passengers. Seventy former trolley buses have been converted to either diesel or gasoline motor buses and 42 older model Twin Coaches have been fitted with Fageol gasoline engines.

A unit system of maintenance is employed. Mileage intervals for replacement of units, of which there are about 20 in a bus, are based on trial and error. Constant effort is made to extend the interval between overhaul without sacrificing safety. Manufacturers never cease trying to improve their products—a better bearing, a more efficient dust shield, a longer wearing material—and we in turn try to capitalize on these improvements by stretching out inspection and repair intervals.

The UTC fleet is lubricated at 3,000 miles, an interval which coincides with our light inspection. At 6,000 miles oil filters are changed and any unit nearly due for removal at that time is carefully checked to determine if it will safely run another 6,000 miles. At 12,000 miles engine oil is changed.

To maintain good appearance so essential to good public relations, buses are painted at six month intervals. This is not a complete paint job but more in the nature of an elaborate touch-up. Lower body panels are given a single coat and vestibules are refinished. After two years the roof is repainted and the third year the interior is completely redone.

A factor which has helped materially in holding man hours to a minimum is our job set-up. When a job is assigned to a mechanic he is supplied with every tool he will need to do an efficient job together with a procedure sheet which outlines the work to be done in a step by step manner, along with a precise estimate of the time normally required to do the job. The procedure sheet serves as a refresher if an old hand happens to be just a little rusty on a particular job. It also is an aid to a newer man should he run into any difficulty which might require more than a normal amount of time or special advice from the foreman. As a result, mechanics seldom if ever need to go after a part or tool or seek information from their supervisors.

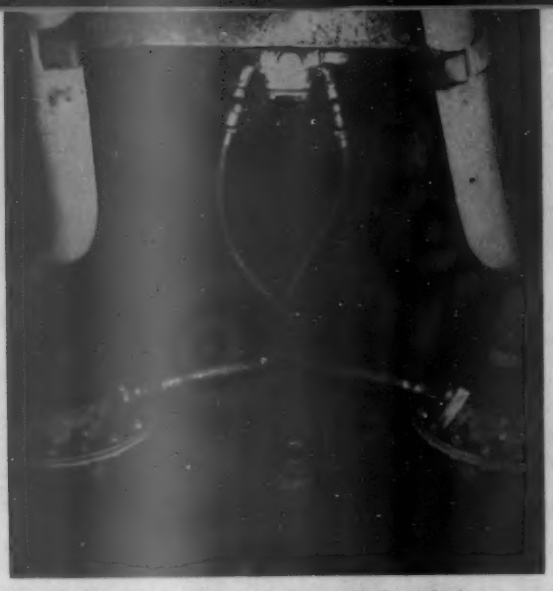
During the 11 months—Jan.-Nov., 1955 inclusive—which include four cold weather months, our MRO par was 15.25 man hours per 1,000 bus miles. This includes 9 paid holidays but not three-week vacations. With both the holidays and vacations included, the par was 16.02. A breakdown of monthly manhour requirements for 11 months is given in the accompanying table. Servicing pars given for four months were started in September and our only UTC requirement for servicing is less than one man hour per bus day.

to a fleet of new buses as you do to a fleet of old ones"

BRAKE BLOCK marked with groove shows depth of bolt. When groove no longer shows on inspection it means bolts are exposed and it's time to reline. Meanwhile, shoes are cleaned and painted with zinc chromate to improve heat transfer and inhibit rust.

TORQUING BLOCKS to shoes at 25 lbs. provides uniform tension and good contact between shoe and block, improving heat transfer and minimizing noise due to vibration. Linings are also matched and are used on matched drums of the same axle.

SPRING TESTER used at San Francisco Muni is part of its balanced brake program. Springs of equal deflection are used on the same axle. A weight is placed on the upper bar in order to test compression springs. Tension springs are tested by placing the weight on the lower bar. The signal light goes out if the springs being tested are too weak. Muni Supervisor C. L. Fent is working on another device for checking brake diaphragm stiffness. It will measure the amount of air required to flex the diaphragm.



SAFETY VALVE on each air line prevents loss of air pressure due to leaks in air line or diaphragm. One valve serves each wheel and another is between compressor and reservoir. Device blocks off the air outlet if a leak develops.

EVERY SET OF LININGS is trued up in place with a brake shoe grinder after lathe turns them down. The vacuum attachment used on the lathe is also adapted to this machine. Muni doesn't shim linings because shims dam heat transfer and shoe radius is smaller.

Muni bus doctors' Rx:

Balanced Brakes For 19% Grades Of San Francisco

IN THREE YEARS, life of brake drums doubled.

That's one outcome of San Francisco Municipal Railway's motor coach brake maintenance program, founded on the principle of balanced brakes.

Despite the beating motor coaches get on the famous San Francisco hills—grades up to 19 per cent—brake diaphragms last 15,000 mi, rear brake blocks 50,000. Brake drum life has been increased from 150,000 to 300,000 mi. Out-of-round drums are no longer a problem. When out-of-roundness does occur it usually is due to high pressure—over 60 lb in the door interlock. This pressure is necessary to hold loads on steep grades. When interlock is applied for long periods the drums are prevented from contracting by pressure of the brakes and distortion may result.

C. L. Fent, supervisor of automotive equipment for Muni since 1951, believes the balanced brake program is a major factor in improved wear. Component parts on each axle—springs, diaphragms, brake linings, drums, bushings—are matched for wear. This helps equalize braking effort, prevent formation of excess heat in any of the brake units and it makes for more efficient brake operation. It also pays off in longer brake life, he says.

Muni also torques blocks to shoes to achieve uniform tension and good contact. It improves heat transfer and eliminates noise that stems from vibrations between block and shoe.

To implement the balanced brake program several devices have been developed at Muni's 24th Street garage to insure paired parts on each axle. Another interesting device used is a safety valve (installed on each wheel) that guards against leaks in the brake diaphragm or air lines.

First, a rundown on brake maintenance procedures:

- Brakes are relined when needed.
- Diaphragms are replaced every five months.
- Drums, cam shafts, grease seals, bushings are inspected for wear when brakes are relined.
- All motor coaches get a visual safety check—brakes, steering mechanism, air hoses and springs—every night or every other night, depending on size of the garage. Brakes are adjusted every other night because of the wear they get on hills.

San Francisco's motor coach fleet consists of 468 White 798s, 170 Mack 049s, and 44 additional Macks are scheduled for delivery. All coaches must be capable of negotiating 19 per cent grades. This because Muni is unable to segregate certain equipment for hilly areas.

Continued on next page

Of 374 regularly scheduled coaches 28 per cent operate on 10-15 per cent grades and 27 per cent on 15-19 per cent grades.

If a safety check shows that need for brake relining is pressing the coach is held in the garage, otherwise it is put on the future list and pulled in during the next few days for relining.

A simple but time-saving trick makes it easy to spot brakes that need relining. Each side of the block is marked with a groove that is slightly above top of the bolt. When the groove is no longer visible it's time to reline. The groove is cut 3/32-in. deep so dirt will not obscure it.

Muni is building a jig with a stationary scribing arm that will mark the lining on all four blocks at the same time while they are on the jig. And when blocks are re-ordered, Muni may specify that they be marked with this groove. If the lining is replaced and put in backward the groove is still visible because it has been cut on both ends of the block, making groove inspection foolproof.

On a reline job, this is what happens: The drum is micrometer-checked for wear. If wear exceeds 0.040 in., the next oversize lining (increasing in increments of 1/16 in.) is used. Both drums on an axle are turned to same oversize. Muni does not grind drums because a smooth enough surface is obtained by turning on a lathe with carboloy tips—and much faster.

The surface of the shoe is cleaned and painted with zinc chromate, a quick-drying substance that inhibits rust and effects good heat transfer between the block and the shoe.

Lining is applied to shoe while coating is still wet. Coating expels air which prevents good heat transfer at same time it serves as a good heat conductor. It is not adhesive.

Grease seals are replaced every time brakes are relined. Fent is experimenting with a Johns-Manville composition seal that can be re-used, and plans to switch to the new seal on all pinions and wheels. On test seals have been used up to five times, and some after 500,000 miles are still in good shape.

Steel bolts are used on brake blocks. Fent says "I haven't been able to find brass bolts that don't stretch from torquing." Initial cost is cheaper for steel bolts and they can be reused. Brass nuts are used for their anti-corrosion quality that makes them easier to reuse.

Blocks are torqued to the shoes with torque wrench set at 25 ft. lb. Fent says he may extend this program and torque wheel to hubs also.

A portable vacuum cleaning device was developed that fits onto the Sheppard-Thomason brake shoe grinder (used for truing up lining every time a set is installed). It also attaches to the brake drum lathe, making turning a much cleaner job.

Muni has adapted the brake drum lathe so it can be used for turning blocks. It does a fast job, taking off material in five minutes that would take an hour to remove with a brake shoe grinder. To adapt the machine, a drum was made with the same radius as a set of brake shoes. The drum fits on the lathe spindle and is fastened with a nut. Blocks are bolted to the drum, then turned. They are finished on the brake shoe grinder. Most frequent need for turning shoes comes when a drum is turned and the next oversize lining must be ground to fit it. A lot of material must be taken off, so it's a natural job for turning. As much as ⅛-in. can be removed from shoes on the lathe.

"We don't shim lining," says Fent, "for two reasons: the dissimilar material creates a dam that reduces heat transference, and the block-to-shoe contact is impaired because radius of the shoe is smaller."

Fent is working on a device that will check stiffness of the diaphragm before it's installed—another precaution of the balancing program. The device will measure amount of air pressure required to flex the diaphragm.

A thorough inspection is made of the cam shaft and bushings. Bushings are replaced, if worn. Muni tests for binding in the bushings by noting how much the cam is deflected by 10 lb. air pressure. On wheels with two bushings, the bushings are line reamed if there is evidence of binding.

If any imbalance is indicated, a check is made with an air pressure gage to see if diaphragms are getting the same amount of air pressure and at the same time.

Springs, diaphragms and shoes are tied together in pairs while awaiting installation to insure a good match.

One of the checks made is on angle of the slack adjuster. Muni discovered that by lengthening the front slack adjuster pressure arm they could overcome a mechanical difficulty with their White coaches—the area of the front diaphragms did not give sufficient braking power. The change in the slack adjuster did the trick by boosting leverage instead of increasing the diaphragm area or the air pressure.

The balancing program has increased the life of rear blocks and reduced life of front blocks, Fent notes. Two rear blocks now wear out in the lifetime of one front block, giving the more desirable 2-1 ratio.

Muni's safety director and the equipment board recommended installation of a brake safety device, and it has been installed on all White coaches and soon will be on the Macks.

It costs less than $25 to equip each coach with four of the safety valves. The device, placed on air lines serving each brake, consists of a valve with a small steel ball that blocks off the air outlet preventing escape of air pressure, if there is a leak in the air line or diaphragm. It operates on static pressure. Ordinarily, air turbulence holds the ball in a pocket when brakes are applied, but a leak releases the static pressure and reverse pressure lifts the ball into a position which blocks off escape of air. The device is simple, easy to maintain, and can not be set off—in absence of air leak—by too much air pressure.

One danger of the static pressure type, it is said, is that too large a diaphragm might deliver too much air to the valve, tripping the safety device. Muni uses 7-in. diaphragms on front wheels, 9-in on rear, and with these, the brake safety valves operate satisfactorily.

To sum it all up, here's what San Francisco Municipal Railway has gotten in the way of benefits from the balanced brake program it follows . . .

It has increased the life of brake diaphragms to approximately 15,000 mi.

It has doubled the life of brake drums—increasing mileage from 150,000 mi to an enviable 300,000 mi.

It has increased the life of other brake components by following the practice of matching them whenever it's possible to do so.

It has increased safety by keeping a close check on the condition of brakes and scheduling them for regular repair and adjustment.

For fuel economy and public relations, Metro says . . .

Positively No Smoking Permitted

METROPOLITAN COACH LINES, Los Angeles and vicinity interurban, is in the happy position of having successfully combined two major goals: improving public relations in smog-conscious Los Angeles, and substantially increasing fuel mileage of its 607 GMC diesel coaches.

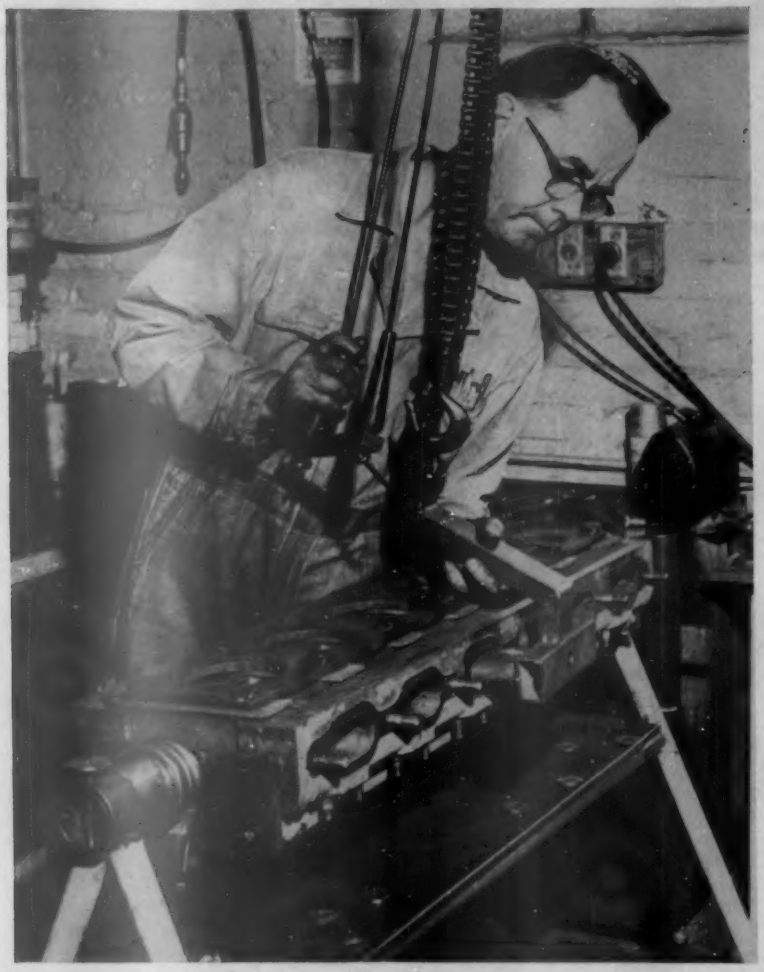
Automotive exhaust has been blamed by air pollution researchers as the greatest single collective source of the substances that react in the Los Angeles atmosphere to form smog. And the public tends to put most of this blame on trucks and buses rather than the area's 2-million-plus private automobiles.

Independent laboratory tests conducted for Metro on diesel coaches gave them a clean bill for the unsaturated hydrocarbons and other combustion products that have been tagged as smog-formers.

But that's a hard point to get across to the man-in-the-street, who doesn't differentiate between types of exhaust. If he sees any visible emissions from a coach, he's convinced the coach is a smog factory.

So it made good public relations sense for Metro to initiate a program to rid its coaches of visible emissions. It made good economic sense, too, since what comes out the exhaust isn't powering the coach.

Result of the program, which was started in early '54; virtual elimination of exhaust smoke, and a 12½ per cent increase in fuel mileage, plus a 107 per cent increase in oil mileage.



THOROUGH TOP OVERHAUL is key part of anti-smoke campaign. Hoist above uses shop-made prongs, of 1½-inch pipe, which fit into exhaust ports.

First step in the program was adoption of a new fuel, with a lower end point. The fuel—a #1 automotive diesel with a cetane rating of 50—was developed for Metro by Standard of California, has an end point of 544°F instead of the 584°F of the previously used fuel. This means more complete combustion at lower temperatures, less unconsumed fuel going out the tail pipe.

Next step, decided on after extensive testing: conversion to new-type injectors, pistons, and sleeves.

All injectors were converted to 55 HV, replacing the 60's and 70's previously used. Less fuel admitted to the cylinders meant fuel economy, less smoke.

It also would have meant less power, except that it was in conjunction with the sleeve change. Figure 8 sleeves were adopted, giving about 33 per cent greater air intake than standard sleeves, meaning more complete combustion, bringing up the horsepower.

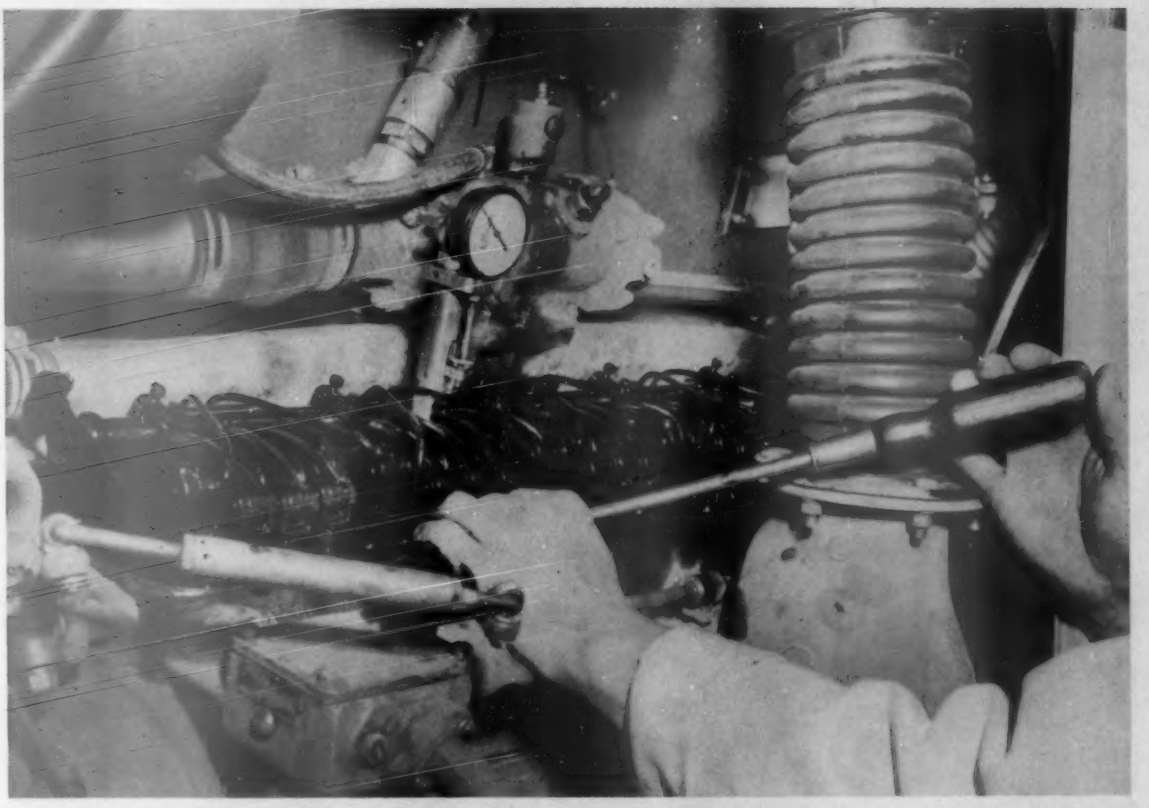
Pistons were changed from 16-1 compression ratio to 17-1, here again meaning more complete combustion, less visible exhaust, more horsepower.

These mechanical changes much more than compensated for the fact that a lighter fuel, yielding less BTU's, would normally mean a drop in mileage.

The new sleeves and pistons were installed at Macy Street, whenever a coach was called in for top overhaul or major overhaul. The changeover on these two items is about 75-80 per cent accomplished.

The new injectors, sleeves and pistons are specified on all new equipment ordered.

A further measure to eliminate visible emissions is now being put into effect. Throttle delay cylinders have been installed on 100 coaches, will eventually be installed on all. By



VALVE GAPPER IS USED INSTEAD OF TIMING GAGE. It's easy to use, and facilitates balancing of injectors, which Metro considers important in its campaign against exhaust smoke in Los Angeles, probably the most smog-conscious city in the U. S.

cutting down the fuel injection on the 55 HV injector to about 35 cmm at full throttle, the delay cylinders eliminate any burst of visible exhaust on takeoff.

These changes are the major part of the Metro program. But also important is the care with which coaches are kept in top condition.

Tune-ups are given regularly at the 12,000-mile inspection. Tune-up specialists check balancing of injectors, governor speed, stall speed, turbine pressure, exhaust back pressure, blower box pressure, fuel pump pressure, valve clearance, injector timing, play in timing gear train.

Coaches are called in before the 12,000-mile mark if a tune-up is indicated. All Metro employees are instructed to watch for visible exhaust on coaches, and to report immediately a smoking coach if spotted. The coach is immediately called in, given a tune-up and whatever is needed. So emphatic is Metro on this subject, that orders are to annul a run rather than send out a smoker.

Need for top overhaul is carefully watched, too. The maintenance department gets from Metro's IBM section daily and monthly reports on fuel and oil consumption of all equipment. As soon as miles per quart of oil drops below a set figure, a coach is called in for inspection, and overhaul if indicated.

Metro is sure this program has paid off from a public relations standpoint, though there is no way to give a statistical measure. From the standpoint of fuel savings, these figures leave no doubt.

In February, 1954—at the start of the program—Metro diesel coaches were averaging 4.30 miles to the gallon, and 147.55 miles to the quart of oil (based on oil added between changes). In March of this year, the figures were 4.84 and 306.01. That's an increase of 12½ per cent in fuel mileage, 107 per cent in oil mileage.

The difference is not explained by the fact that 230 new coaches have been acquired during the period (out of the present total of 607). PDA-3701 GMC coaches (made in 1940) were averaging 5.59 miles per gallon in February, 1954, and 5.92 in March, 1956. (These coaches do better than the overall average because they have manual gear boxes and are on runs with less stop-and-go.) TDH-4502 and TDH-4506 GMC coaches (most of 1942 vintage, some of 1945) were getting 4.07 miles per gallon in February, 1954, and 5.04 in March, 1956.

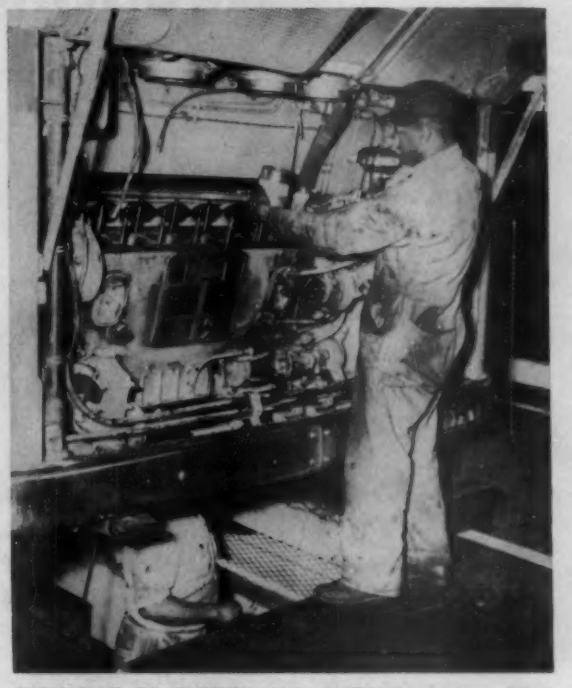
Figured on the basis of an average .54 miles per gallon increase between February '54 and March '56, applied to the 1,825,000 miles per month travelled by Metro diesel coaches, the fuel savings amount to about $10,000 a month.

And most of this is profit. The new fuel costs about the same as the old. Conversion cost (injectors, pistons, sleeves) has amounted to about $200 per engine for new parts. Labor and other material are part of normal maintenance and mean no increase in overall maintenance cost.

INJECTORS ARE CONVERTED to 55 HV at central maintenance facility, using GM conversion kit. All work is in a closed room.

INJECTORS ARE INSPECTED and checked with a tester during top overhaul, when they're cleaned and repaired if necessary.

FIGURE 8 SLEEVE at left has been substituted for standard sleeve at right for better combustion and more horsepower.



EXCHANGE OF SLEEVES AND PISTONS is accomplished during top or major overhaul at Metro's central maintenance shop.

INSIDE of bus gets full treatment on roof, sides and floor. On new surfaces a primer coat and two coats of enamel are used.

Adapting a Radically New

NEW INTERIOR gleams like a coach just off the assembly line, with refinished seats, new flooring and new sash when needed.

By J. T. Hurry • *Supt. of Equipment*
Dallas Transit Co.

WHEN DALLAS TRANSIT CO. recently invested $1¼ million in fleet modernization—55 new 50-passenger Southern Coach diesel buses were bought to replace the last of its streetcars—it was decided to adopt new color styling for the 55 new buses.

The idea was to make them radically different from our conventional color styling in order to make the public fully aware of DTC's sizeable equipment investment.

In doing this, though, another problem was created—what to do about some 475 conventionally painted buses already in service. How would the public react to them?

The answer, obviously, was to adopt the new color scheme for the entire Dallas fleet of 529 buses.

The new color scheme came into being last July, when DTC President W. R. Burns retained industrial designer J. O. Lambert to impart a "new look" to the new fleet. Sole stipulation was that the safety color factor not be sacrificed for beauty. Actually, Lambert's objective was an exterior design in readily-defined, crisp, nearly pastel colors which would give the bus the appearance of an oversized private automobile.

The "size illusion" is achieved through use of a modified aerodynamic tear-drop design in an off-white color

OUTSIDE of bus gets the gleam of newness too. A bleeder coat, a primer coat and two coats of enamel are used.

Color Scheme to Older Buses

which extends almost the full length of the bus. Front panels and roof top also are treated in the same color. Off-white has advantages which include good visibility, both for safety and for ready identification by waiting passengers. And surprisingly, it does not show soil readily.

As a second color, for pleasing contrast, a pastel green known as "spruce" is used on 27 of the new buses, while "sunshine" yellow is used on the remaining twenty-eight.

Ultimately, the entire fleet at Dallas will be restyled in two-tone color combinations. A continuous refinishing program is now well under way. The schedule of exterior and interior refinishing and general refurbishing this year calls for 92 buses at the rate of about two a week. This particular group of buses will be done either in a blue and white or spruce and white exterior-interior color combination.

Although DTC has followed the general practice of the transit industry and sold advertising space on the exteriors of buses, under the new program garish advertising along the top edge of the bus roof and flamboyant "spectaculars" on side panels will be eliminated in favor of more subdued advertisements below the window line.

The initial step in transforming one of DTC's older buses into a smart, modern-looking piece of transporta-

Continued on next page

NEW EXTERIOR after 170 man hours and 32 quarts of paint. Engineer M. Nesuda and Foreman W. Simmons admire the quality job.

tion is first to give the body and frame a very thorough going over. Any damage to frame or to spring hangers is repaired . . . doors and window sash are reconditioned if necessary . . . body dents are smoothed out and damaged panels replaced

On the inside of the vehicle, flooring, ceiling and interior panels are carefully examined and all damage repaired. Seat backs and cushions are removed for reconditioning or complete reupholstering if needed.

By year end, DTC will have about 150 buses—including the 55 new ones—refinished with the new tear drop styling and in operation on Dallas streets. There will be 375 with the conventional color scheme. Based on the present schedule of two buses a week, it will take about four years to repaint the entire fleet.

The two-a-week refinishing schedule allows DTC shops to turn out a superior paint job comparable in every respect to a custom shop job. As a matter of fact, the average bus rider has difficulty in distinguishing the refinished buses from the new ones.

DTC officials realize that a bold new color scheme may be a fine thing for new buses, but to adapt it to older vehicles may invite invidious comparison unless the older buses have all indications of wear and tear, all traffic scars carefully erased. That's why we place such emphasis on the renovation of shabby seats, worn floor covering, sagging window sash and scratched and dented body panels.

It is for these reasons that the refinishing and refurbishing schedule is on a two-a-week basis. Each bus going through this program calls for an average of 170 man hours for all exterior and interior work.

Average cost of this rehabilitation is $650, which includes all material and all labor.

Prior to refinishing the exterior, panel dents and scratches are removed, after which the body surface is sanded to a smooth finish. In refinishing the exteriors, a four coat process is employed, namely, a bleeder coat, a coat of primer seal and two coats of enamel. All are applied by the cold spray method.

In the interior, for the refinishing of new materials such as headings and panels, one coat of primer and two coats of enamel are used. In refinishing areas which had been painted previously, no primer is used, but two coats of enamel are applied. We use DuPont refinishing materials throughout, and it requires 32 quarts of refinishing material for the exterior and interior.

As part of the program, all seats cushions and backs are removed. Leather upholstery is redyed with "Magidiz," which imparts a newness to leather coverings that have lost their lustre through use, but otherwise are in good condition. About 12 quarts of "Magidiz" are needed to do the seats in a bus. When the upholstery material needs replacing, Goodrich "Koroseal" is used.

Window sashes are inspected and, if necessary, new felts installed. For floor covering, DTC uses Goodyear "Griptread" for smaller jobs and Armstrong "Automat" for large jobs. We apply covering with Rub-Bub neoprene cement.

At Dallas Transit we take great pride in the high quality work turned out by our shop force. It costs more to do first class work, but in the long run it is cheaper.

• *An important factor in any good painting operation is care of spray guns. Following are recommendations by DeVilbiss, leading spray gun manufacturer, on proper maintenance of spray gun equipment. These should help you get the most out of your spray guns.*

For Better

1 • The spray gun is a precision-built tool and must be handled with the same care as other fine instruments. Clean it thoroughly after each spraying job.

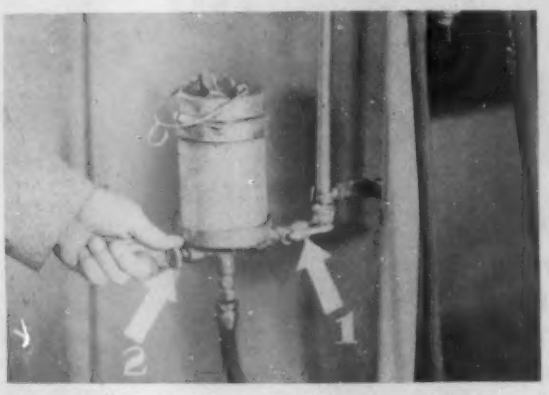
4 • Clean fluid passageways by replacing cup and tightening the air cap. Then spray solvent . . . the cup should be half filled with solvent for this operation.

7 • If the air cap is dirty, remove and soak in solvent . . . then brush and wipe the cap. If fluid tip is dirty, brush and wipe also. Use only soft brushes.

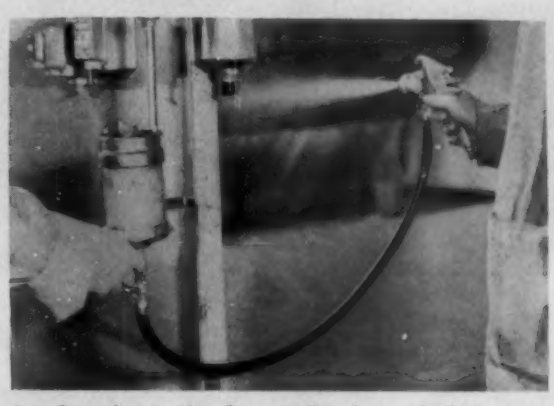
Paint Jobs — Look to Your Guns

2 • Do not completely immerse spray gun in a container of solvent to clean it. Air passages of the gun will foul and lubricants will be removed from packings and springs.

3 • Fluid passages of a cup gun can be cleaned by removing cup and loosing air cap two or three turns. Hold a cloth over air cap and pull trigger. Empty cup and clean it thoroughly.



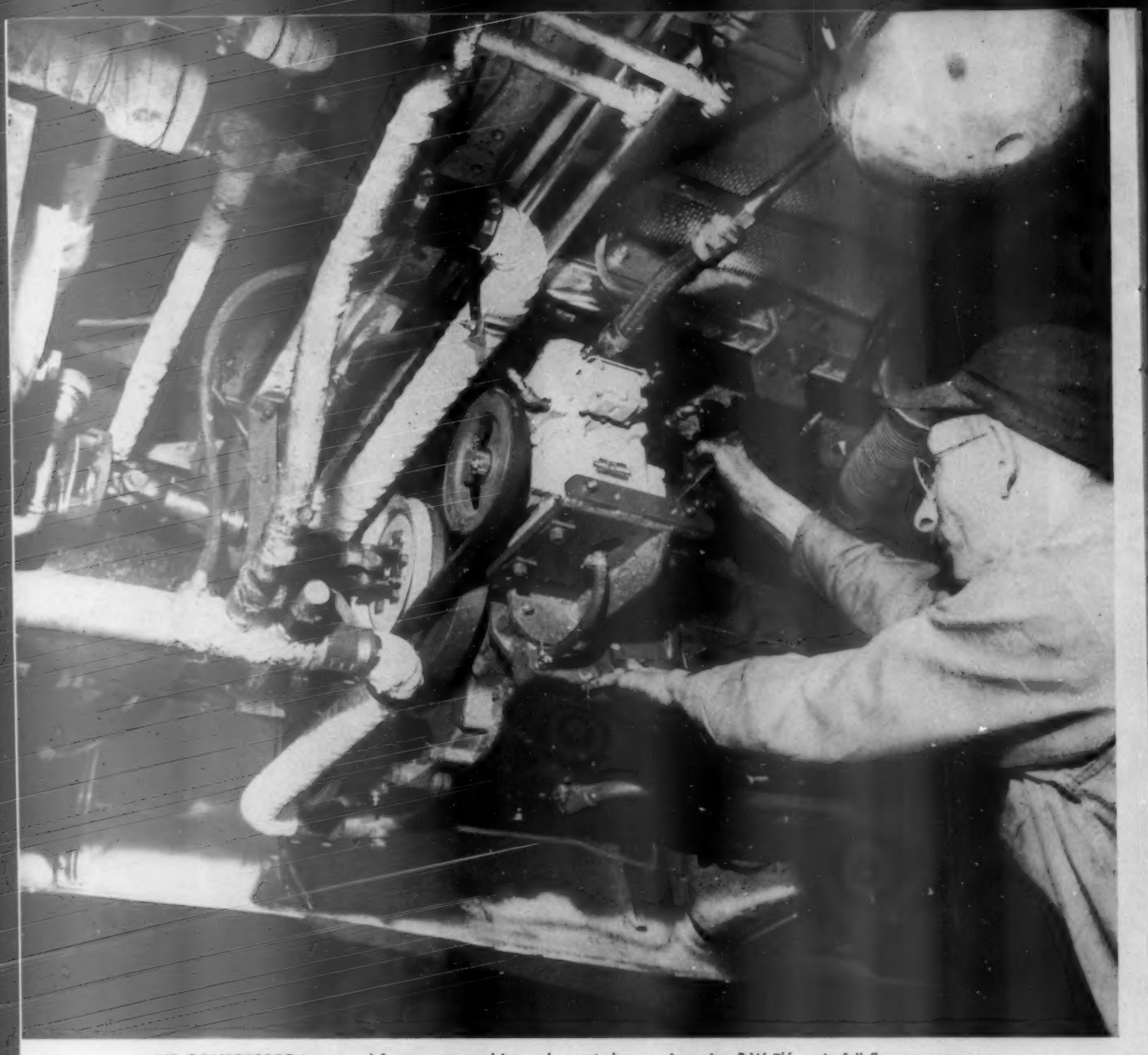
5 • Use a hose cleaner for guns which receive material through a fluid hose. Air valve (1) controls air, and needle valve (2) controls solvent, forcing mixture through. After attaching gun . . .



6 • Open the air valve. Open needle valve, gradually increasing it to wide open position . . . then close. Repeat if necessary till clean solvent flows from gun. Dry by passing air through gun.

8 • Clean holes in cap with a toothpick or fine broom straw. Never ream air cap holes with wire, metal tools, etc., as it may damage the holes and result in imperfect spray patterns.

9 • Daily, and after each cleaning, oil the fluid needle packing, the air valve stem and the trigger bearing screw. Proper lubrication assures long, trouble-free operation of your spray gun.



AIR COMPRESSOR is removed from accessory drive and mounted on engine using B-W 7½-cu in full flow compressor.

Fuel Mileage Went up 81% When

Converting 60 ACF-Brills from gasoline to diesel engines resulted in outstanding fuel economy.

Total cost of the conversion kit is $300 . . . and a five-man crew does the job in 200 man hours.

By A. J. Holt • *Supt. of Equipment*
Southern Pennsylvania Bus Company

TWO YEARS AGO Southern Pennsylvania Bus Co. in Chester, Pa. converted one of its 60 ACF-Brill C-36 buses from gasoline to diesel power.

In 1954, the last year in which we used gasoline exclusively as a fuel, we used 912,802 gallons, for a fleet average rate of 4.06 miles per gallon, with an average vehicle age of 121 months.

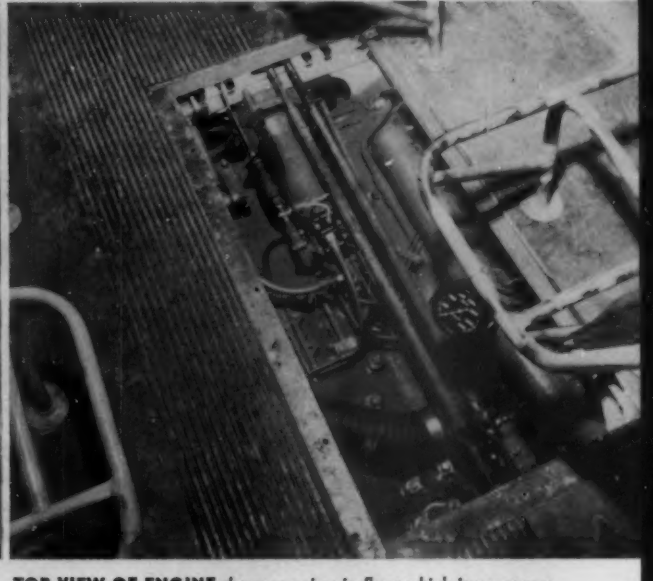
But we hoped to do better with conversion to diesels. The engine we selected for the trial, and subsequent conversions as well, was the Leyland diesel, a British design modified to meet U.S. automotive standards and distributed by Twin Coach.

The experiment proved successful in trouble-free operation, satisfactory power output and fuel economy,

COMPLETELY REWORKED FRAME for diesel conversion. New front motor hanger bracket and longitudinal frame must be installed, and a fiberglass material used to help eliminate noise.

FRONT AND LOWER PART OF ENGINE with conversion completed in four to five days. Entire conversion kit, except engine mounting brackets, is fabricated in SPB shop.

A STABILIZER BAR is necessary to eliminate danger to rubber bushing when the hand brake is applied.



TOP VIEW OF ENGINE shows opening in floor which is necessary to service Roosa Master pump, shifting rods and air intake.

Southern Penn Went to Diesels

with the converted bus operating both in heavy city traffic and in fast city-suburban service.

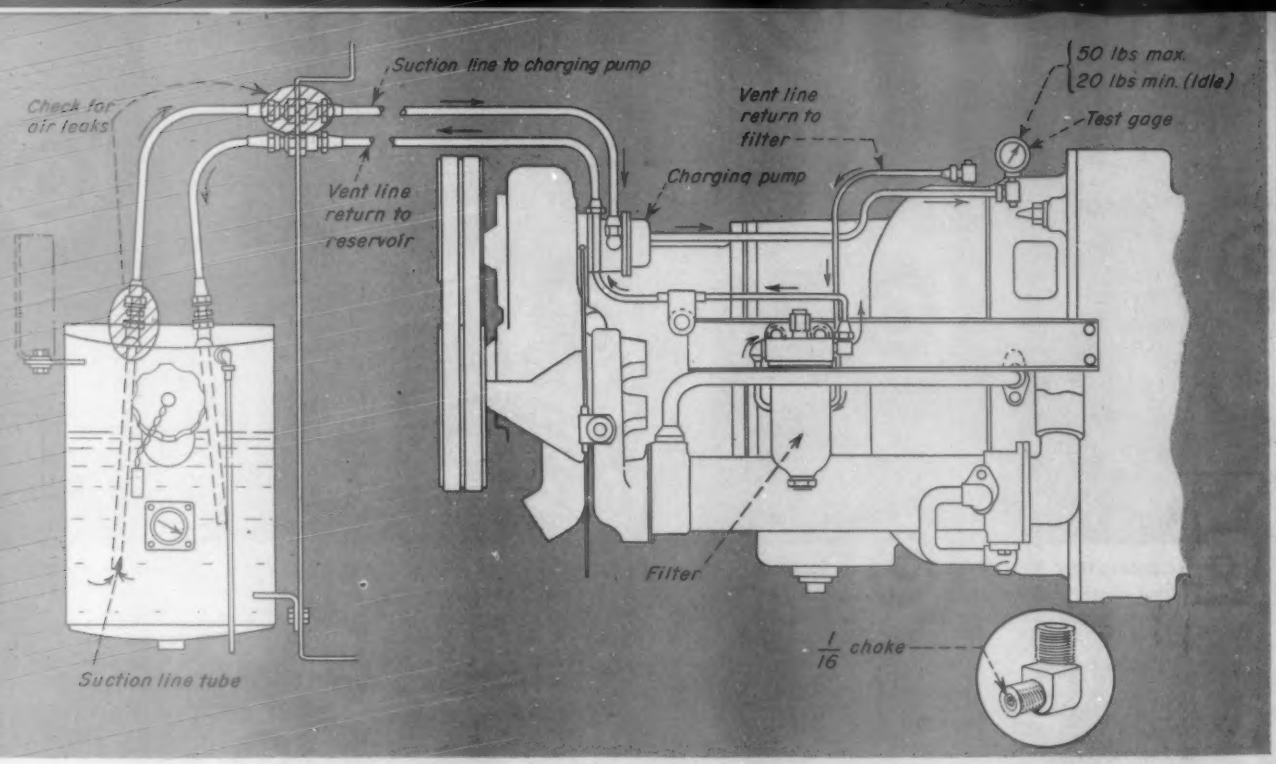
It operated more than 6,000 miles per month from September through December, with an average fuel consumption of 7.6 mpg. This was a clear gain of 87 per cent in fuel mileage.

On the basis of this performance, SPB decided to equip its fleet of 60 C-36's with the Leyland diesel.

Mileage records for 1954 showed that each bus traveled an average of 39,839 miles and consumed 9,813 gal of gasoline per year. By converting to diesel power, with an indicated average of 7.6 mpg, the annual fuel consumption would be at the rate of 5,242 gallons per bus—or a clear saving of 4,571 gallons of fuel per bus per year, or a total annual fuel saving of 274,000 gallons.

In making the conversion a number of changes had to be made in the frame. New front and longitudinal frame members had to be installed, and it was necessary to reinforce the frame at various points. The air intake, inside the bus with a gasoline powerplant, had to be relocated because of the greater volume of air required by the diesels.

As of March of this year a total of 55 converted diesels had been put into service. They have run a total of 1,904,699 miles at an average of 7.368 mpg on #2 diesel fuel, an increase of 81 per cent. Three of them are equipped with 916 Spicer torque converters, while the rest have standard transmissions.



1. TYPICAL HYDRAULIC SYSTEM is shown in the drawing above. Note the position of the pressure gage inserted in the converter charging line, which is used to reveal defects in the pump or suction line, missing choke fittings, etc.

Torque Converter Maintenance—

This is the first of three articles on torque converter maintenance, prepared especially for BUS TRANSPORTATION by the Dana Corporation of Toledo, Ohio. The second article in this series will appear next month.

THE CRITICAL ITEMS IN TORQUE CONVERTER LIFE are hydraulic seals, direct drive and converter roller clutch assemblies.

To materially increase the life of these three elements cleanliness is important. So is proper assembly of the latest production parts. The use of salvage material in these assemblies has, in general, proved very unsatisfactory.

We found this out when it was discovered that new coach deliveries almost invariably gave higher mileages than rebuilt units, even on properties which had a very good rebuild program. The short life of rebuilt units on such properties has usually been traced to defective external items connected with converter operation. Converter seal leakage, for example, has been stopped repeatedly by locating and correcting defects in the pump charging system.

Coaches reported for seal leakage, excessive torque fluid make-up, engine or converter overheating, loss of power, etc., should be promptly inspected for leaks in the hydraulic system. A pressure gage inserted in the converter charging line will reveal defects in the pump, suction line, milling choke fittings, etc. *(See Fig. 1).*

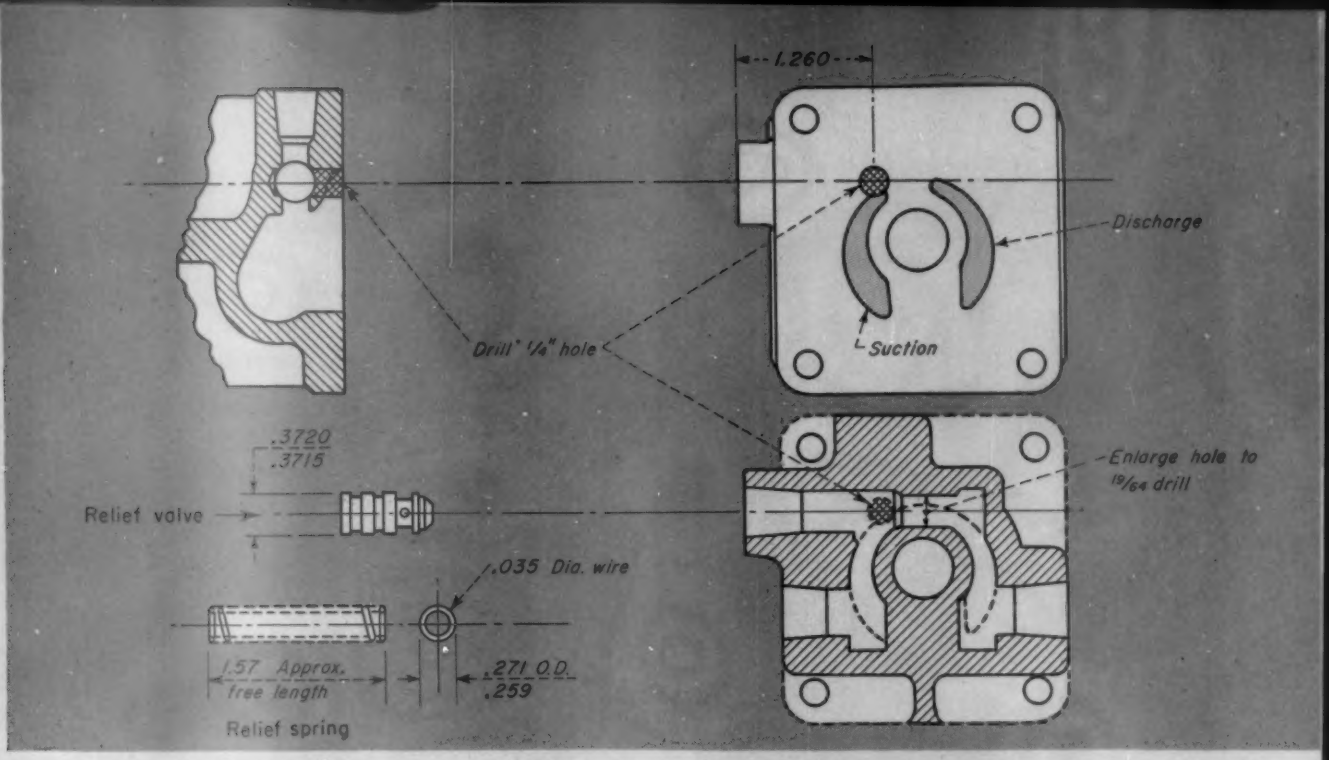
Pump performance at idle speed reveals more about operating conditions in coaches than a pump bench test alone, where flow and maximum pressure regulation are checked. At idle speed, the pump or the system may not be efficient enough to give required pressures, even though in the bench test it checked acceptable at higher speeds.

The principle of operation for torque converters is basically the same in all coaches, and this is especially true for hydraulic systems.

For proper operation, the hydraulic system must be full of fluid at all times. On most coaches a converter charging pump is used to keep the system full of fluid and maintain a minimum operating pressure—(about 25-30 lbs)—to the center of the converter.

A cavitation, or vent line, is used to permit entrapped air foam, etc. to bleed from the system. A choke in the vent line is necessary, and there is a filter in the vent line to prevent plugging of the choke fitting, (1/16-in. orifice), which should be positioned on the discharge side of the filter. *(See Fig. 1).*

For proper converter operation you must have good idle pressure and the choke fitting in place. Proper



2. NEW TYPE CONVERTER CHARGING PUMP incorporates several improvements in internal design. Drawing above shows how to rework older Eaton converter charging pump in order to duplicate the improvements built into the later models.

Part I: The Hydraulic System

pressures permit fast acceleration, eliminate seal leakage and prevent overheating.

With low idle pressure, or none at all, the impeller creates a suction at the center of the hydraulic section when the coach accelerates. This suction can separate hydraulic seal surfaces and suck air into the center of the converter, which aerates and causes foaming of fluid.

Upsetting the seals in this manner usually produces seal leakage which continues until pressure is restored on the center section and the seal surfaces reseat themselves.

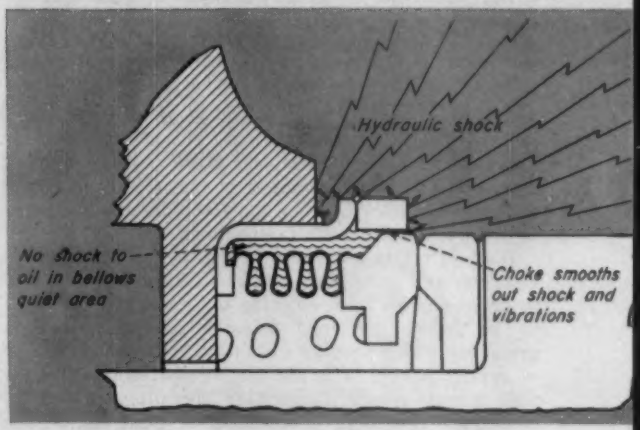
A missing choke fitting in the vent line will produce the above conditions also, since the hydraulic section will eventually return more fluid to the reservoir than the charging pump can return to the center of the converter. Surplus fluid returned to the reservoir tank is usually lost out the vent or overflow pipe.

The suction line to the charging pump is also a source of trouble. Any restrictions such as filters, swelling of flexible tubing, or even heavier torque fluids in cold weather, impose high suction loads on charging pumps.

On present coaches it's not uncommon to find a suction of 29 inches Hg when the coach is first started and the pump is filling voids in converter and lines. Later this suction drops to seven inches Hg after the lines are full and the fluid is warm.

The high initial suction, though, could cause lip seal failures on the charging pump input shaft, permitting the pump to suck air.

Another glance at *Figure 1* shows that loose pipe fittings, connectors, frayed hoses and loose standpipes in reservoirs permit the pump to suck air instead of solid oil.



3. DAMPENER SEALS SHOULD BE INSTALLED at the overhaul period. Cutaway view in drawing above shows how seal operates to reduce hydraulic shock and vibration.

Most reservoirs have the fittings sweated in place, and solder loosening around suction standpipes has produced numerous air leaks.

Most flexible lines are not stable when handling hot torque converter fluids. They either swell, or shrink

Continued on next page

4. INSTALLATION OF BELLOWS SEALS on older equipment may require rubber cement. It should be applied lightly only to the bottom, outside radius and outside surface of the bellows cup.

5. PROPER TOOLS for installing bellows seals can eliminate the use of rubber cement. An arbor press is used with a 916-12 or 918-12 seal driver and a 916-13 or 918-13 driver plate.

and harden, tending to choke off suction to the pump. For this reason operators should check such hoses on a definite schedule, and replace those showing signs of deterioration. When repiping a coach it is advisable to use larger lines between the reservoir and the pump in order to reduce suction restrictions.

It's best not to use filters in the suction line between reservoir and pump, but wire mesh screen may be used to prevent chips from entering the lines.

The defects described above all contribute to low pressures, which produce cavitation. That results in loss of engine power, or in the engine operating at higher than normal speeds. Continuous operation under these conditions results in overheating of both engine and converter fluids to produce sludge, varnish deposits and complete breakdown of oils.

Pump rotor bearing failures are frequently caused by cavitation and overheating of torque fluids, too. The higher operating temperatures thin out and run off grease from the pump bearing cap. And in some cases excessive nosepiece wear of both bellows and carbon seals has been associated with caviation.

Some later model coaches now incorporate an air loaded reservoir tank to maintain 30-35 lbs pressure on the center of the converter, as it's important that this pressure be maintained at all times.

Air is usually admitted to the reservoir by an electrical solenoid connected through a running circuit switch on the instrument panel.

This hookup is not always desirable, as drivers sometimes shut off the circuit to prevent shifting of the converter into direct drive. The loss of pressure on the reservoir then produces cavitation and the same conditions as outlined previously for defective pumps.

It is also very important that the proper choke (.106 dia. orifice or 7/64 drill) be used in this installation, and that the choke be located on the outlet connection of the filter.

The pump used to charge hydraulic sections on most converter installations plays a very important part in converter life and performance.

Unfortunately, this pump is sometimes neglected, and replaced only after it has completely worn out.

Although the same basic pump has been used in the past few years, there have been several recent improvements in internal design. For example, later pumps incorporate improved porting to permit the relief valve to hold maximum regulated pressures. Installing the original, or 2.5 lb relief valve spring, restores idle pressures to the desirable 20-25 lb. minimum. *(See Fig. 2.)* The fit of the relief valve plunger has been reduced to eliminate the tendency of valves to stick.

We strongly suggest that operators have old style pumps reworked to incorporate the improvements shown in *Figure 2.* The desired minimum idle pressure of 20-25 lbs can be secured by using the heavier relief valve

6. CHECKING FOR LOOSE CARBONS is good preventive maintenance practice. Pitted, chipped or worn carbons should be replaced when the 45-deg edge is completely worn down.

spring even if the old body has not been reworked. This change will give higher than normal maximum pressures, but we feel that this is the lesser of two evils.

Dampener ring seals should be installed at the overhaul period to eliminate bellows failures and reduce nosepiece wear. *(See Fig. 3.)*

Our observations in the field reveal that some operators are still reusing some very old seals. These have certainly served their purpose and should be removed and scrapped during overhaul.

Another good idea is to identify and date seals when installing them. This simplifies weeding out of questionable seals with high mileages and numerous relaps.

Many mechanics are still using surplus amounts of rubber cement during installation of bellows seals. It isn't necessary. For example, new parts have .003 to .006 interference fit between bellows cup and seal bore. The bellows cup is round and held to size by grinding. The interference fit should be fluid tight, and in fact, bellows seals have been installed on the assembly line for years without any sealing agent whatsoever.

Older equipment, however, may require rubber cement to give a tight fluid seal. The following is recommended . . .

Do not apply rubber cement or sealer in the seal bores. Apply a light coat of rubber cement to the bottom, outside radius and outside surface of the bellows cup only. *(See Fig. 4.)*

Cement applied to the bottom and sides of the seal bore is wiped downward into the bore and hardens in the bellows convolutions. This destroys bellows action, with resultant bellows failures.

The proper tools for installing bellows seals can eliminate use of rubber cement for fluid-tight fits. *(See Fig. 5.)* The guide or piloted type seal driver prevents cocking and distortion of the bellows cup, and consequent leakage around the cup.

Another point is to avoid hammering after the seal has bottomed, as it will destroy the fit.

When replacing carbon seals the carbon mounting surface should be cleaned with alcohol or lacquer thinner prior to bonding. Use "Scotch-Weld" and approved 4-250-watt infra-red heat lamps to bond carbons to pump and turbine rotors.

Temperatures at bonding surface must reach 390-400 deg F to attach the carbon to the steel.

Pitted, chipped or worn carbons should be replaced when the 45-deg beveled edge has been completely worn down . . . and it's a good practice to check for loose carbons on high mileage units. *(See Fig. 6.)*

Although replacement carbons have already been lapped, they must be checked for flatness and relapped if necessary *after* bonding to pump and turbine rotors and cooled to room temperature.

If old carbons are reused, glazed surfaces must be removed to permit proper seating.

The recommended method of lapping seals is . . .

1. Use lapping stones, kerosene and flat frosted plate glass for carbon seals.

2. The cutting surface of stone may be prepared quickly by rubbing with circular motion on a fine emery cloth laid over frosted glass. For carbon lapping, wet stone with diesel fuel and lap carbon with circular motion. Redress stone frequently on frosted glass, letting carbon residue accumulate for lapping compound.

3. Wipe carbons clean with tissue and alcohol. Wipe them dry with tissue only.

4. Check flatness of carbon contact, using a minimum of prussian blue on checking ring. A light coat of bluing gives a more accurate flatness reading.

5. Continue lapping carbon until checking ring impression shows full width contact for 360 deg.

We do not recommend the use of levigated alumina or paste type lapping compounds on carbon seals. The reason is that the seals are porous and easily charged with lapping compound, which later prevents glazing and promotes rapid wear of the nosepiece.

Regardless of the lapping method preferred, it is essential that all traces of lapping residue be removed from the pores and around the carbon seal areas.

Therefore you should wash the carbon seal with clean kerosene and use a brush to clean out areas around the snap-ring, belleville, etc. Wipe dry with clean rags, and finish cleaning the carbon contact surface with tissues and alcohol. Solvents and spirits, etc., should never be used to clean carbon seals.

The cleanliness of the sealing contact surface at the time of assembly is the key to quick glaze and long wear of both carbon and bellows seals.

The carbon seal and bellows nosepiece should be cleaned and lubricated immediately prior to actual mating of faces. At the time of assembly, mechanics should clean the carbon and bellows nosepiece with lacquer thinner and tissue . . . then wipe them dry and add diesel fuel or torque fluid to the nosepiece only.

Use of heavier oils for contact lube at assembly is not recommended.

On converter changeovers we repeat again: do not remove converters for seal leakage until pressure gage checks have been made.

During installation of rebuilt converters we recommend that the hydraulic section be pre-loaded with torque fluid before starting the engine. Don't use the engine-driven charging pump to fill the hydraulic section of the converter.

Since high temperatures are developed at the bellows nosepiece and carbon during the break-in period,

Continued on page 91

BEFORE: Demounting tires with sledge and irons took lots of muscle and time—up to 15 minutes when tightly stuck.

MTC Halves Demounting Time

MONTREAL TRANSPORTATION COMMISSION rents tires on a mileage contract the same as most United States bus operators. But this big Canadian transportation system handles all tire service and repairs on a fleet of 1,156 rubber-tired vehicles—930 gasoline and diesel buses, 105 trolley buses and 121 service vehicles such as trucks, cars, loaders and compressors.

In rolling up some 2.5 to three million miles a month, these vehicles are subject to all kinds of wear and tear which necessitates the removal of between 700 and 800 tires a month for one reason or another.

During the course of a year the Commission's tire department, which is under the supervision of S. D. Urquhart, is called upon to repair about 4,000 tire damages. Consequently, it is to the interest of the Commission to expedite repairs in every possible way and toward that end it has developed special equipment to facilitate such work. A number of machines known as "spotters," designed to spot-vulcanize a damaged tire without demounting it from the wheel, were described in BUS TRANSPORTATION in July 1954.

The latest piece of equipment developed by MTC's tire department is a fixture for demounting tires from wheels. It operates at the rate of ten jobs in 24 minutes. Prior to the development of the machine, the job of separating a tire from a wheel required from five to ten minutes of hard manual labor and even more if the tire was stuck tightly to the rim.

AFTER: Hydraulic pressure of 20 tons with fixture developed by MTC forces tires off at rate of ten in 24 minutes.

with Hydraulic Tire Tool

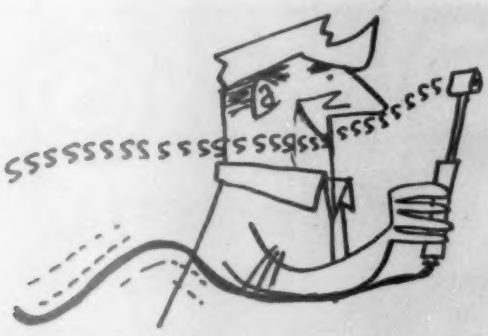
The tire demounter cost $550, which includes all labor and the major components, a hydraulic pump and ram. The ram is operated by a Blackhawk Porto Power pump, and exerts a pressure of 20 tons, which is more than ample.

A feature of the demounter is that the tire and wheel need not be fastened down with clamps or bolts. The wheel is simply placed on a block which centers it automatically. The claws and cross member with spacer is then assembled in the manner shown and when pressure is applied by means of the Porto Power pump, the ram forces the tire downward and off the wheel.

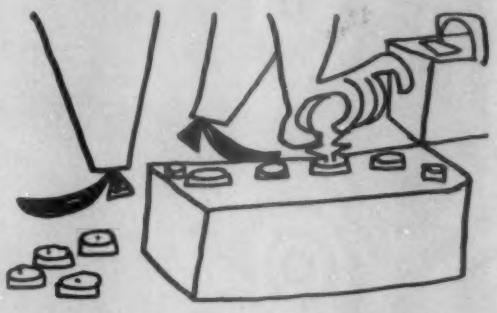
To get an idea of the scope of the operations at MTC, see the box at the right . . .

Here are some tire statistics for a recent month, stressing the importance of time and labor savings . . .

Tires removed from buses for inspection	721
Tires demounted from wheels	502
Tire sections rebuilt	96
Tires repaired by spot vulcanizing	253
Vulcanized boots installed	2
Cemented boots installed	27
Tires recapped	61
Tires regrooved	144
Tires repaired with plugs	505
Tubes repaired (nail holes or cuts)	290
Valve stems changed	52



IDEA 1 • With synthetic rubber tubes now generally in use, it has been found no longer necessary to inflate tires every week. It can be avoided by changing them when loss of air is found, either on regular scheduled inspections or on the daily check for "flats."



IDEA 2 • As a general rule, batteries do not need watering between inspections if the current regulators have been properly set. This applies in most cases, but there may well be exceptions on buses which are used on high mileage interurban routes during very hot weather.

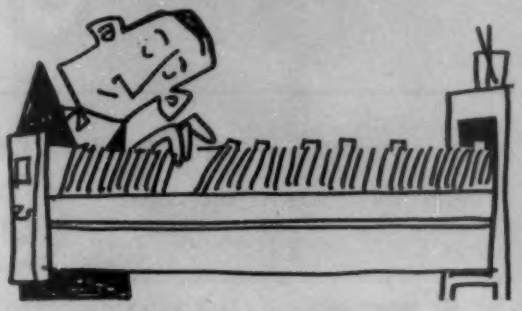
IDEA 5 • Not so long ago, 2,000 miles was about maximum for scheduling inspection frequencies, due to mechanical and lubricating limitations. In city service it has been possible to increase this to 3,000 and 4,000-mile periods, and sometimes even more, with an intermediate brake check, without running into serious trouble. Arithmetically, an increase from 3,000 to 4,000 miles indicates a saving on inspection labor of 25 per cent; in practice it will be somewhat less, as more work will have to be done when the vehicle is in for inspection. Items on each schedule require periodic reviewing, not only to insure maximum mileage between inspections, but also to avoid the possibility of continuing some procedure established to correct a condition long after that particular condition has been corrected.

IDEA 6 • Increased mileage is being secured from all units, with the unit mileage change system a thing of the past. A short time ago it was common to hear bragging about air compressors which were changed at 100,000-mile intervals. But generally the ones doing the bragging forgot to mention that application valves, relay valves, door control valves and the like were changed by the bushel. Now compressors are changed when they "pump" oil, with the result that satisfactory mileage is secured for the air accessory units . . . and miles between compressor changes have been increased by doing a better job on compressor overhaul.

Are You Behind Times? Here Are

You should consider them especially if you still are . . . using the same inspection period you did 5-10 years ago . . . inflating tires on a weekly basis . . . watering batteries between inspections . . . lubricating generators too often . . . keeping records that have outlived their value.

IDEA 3 • As bus operating schedules are constantly changing, shop crews may need revising with each board change. A valuable tool is the vehicle run-in time. This permits scheduling of work with a minimum of men. Often better work can be done with two shifts instead of three.



IDEA 4 • Records are an essential part of any business or department . . . but they can be overdone. Often records are kept which have long outlived their usefulness. One rule is to keep no record which is not required by law or which does not support itself. Besides, clerks cost money.

IDEA 7 • Generators come equipped with oil or grease cups, but more damage can be done by overgreasing than by running dry. If the amount of lubricant cannot be controlled, bearings can be packed at the time of overhaul with high temperature greases and the grease cups removed. Don't overfill . . . slip off the end plate every 50,000 miles for a look, and consider sealed-type bearings. Since labor and material, outside of taxes, represent costs, both must be subject to constant scrutiny and, as 65 per cent of our revenue dollar is spent for labor, manpower must be fully utilized. Mention has been made of savings in inspection, but no other facet of operations should be overlooked.

IDEA 8 • Needless to say, close attention must be paid to material control, both on the job and on the shelf. Only foremen should authorize the use of new parts, and then only after they have satisfied themselves that they are essential. Furthermore, it should not be left to a mechanic to determine when a unit should be changed. There are few material and parts shortages. Inventories have been substantially reduced, but still require constant attention. Obsolescent material should be watched, or the maintenance man will be faced with costly write-offs. Reordering should be done only by authority of the maintenance superintendent, and then only after he has explored the real need of doing so. Batteries should not be stocked, as monthly needs are easily determined.

Eight Ideas You Should Consider

IN THE LAST DECADE many of the maintenance man's mechanical problems have disappeared with improvements in design, material, lubricants and know-how.

Nevertheless, his job today is no less difficult, as he has been caught in the squeeze between dwindling revenue and rising costs.

He has, therefore, been forced to use every means at his disposal to help his company stay in business. Often this has meant a thorough reappraisal of old and time-tested ways of doing things. Sometimes it's found that the old way is still the best way . . . very often it's the other way around, and the old way must yield to a new and better method.

The above ideas concern changes which generally took place in the past ten years. It will be interesting to look at them again ten years from now.

Analysis of Engine Overhaul Cost

OPERATION	SAMPLE ENGINE Labor Hours	Material	Total	AVERAGE ENGINE Labor Hours	Material	Total
1. Smoke meter test	.5	$.....	$ 1.30	.....	$.....	$.....
2. Spot bus, remove body panels and bracing	3.0	.....	7.90	3.0	.....	7.90
3. Disconnect power plant, air, fuel, water and drive lines	2.8	.....	7.35	2.8	.....	7.35
4. Remove power plant and mount on carrier rack	.5	.....	1.30	.5	.....	1.30
5. Spot power plant in cleaning room and clear	1.5	.30	3.85	1.5	.30	3.85
6. Strip engine, clean parts, assemble them on carrier rack	9.0	1.80	24.40	9.0	1.80	24.40
7. Spot rack in engine shop, sort material in usable, reclaimable and not usable condition	2.2	.....	5.80	2.2	.....	5.80
8. Clean and test block for leaks	2.5	.....	6.45	2.5	.....	6.45
9. Rebore block	....	.....	.....	4.3	.....	11.15
10. Resleeve block	1.5	89.20	93.05	.8	45.40	47.45
11. Rehone block	2.5	.....	6.45	3.8	.....	9.80
12. Resurface heads	....	.....	.....	1.0	.....	2.60
13. Install valve inserts	....	.....	.....	.8	6.30	8.35
14. Grind valve seats, assemble and test heads	9.2	5.05	28.50	9.7	35.20	59.95
15. Regrind cam shaft	1.8	.....	4.75	3.5	.55	9.70
16. Clean and dye check crankshaft	1.7	.10	4.45	1.7	.10	4.45
17. Machine and straighten crankshaft	1.5	.....	3.90	2.0	.....	5.25
18. Regrind crankshaft	4.8	.....	12.55	4.8	.....	12.55
19. Linebore crank and cam shaft bearings	5.8	36.90	52.35	7.5	44.40	64.35
20. Check rod alignment	.7	.....	1.85	.7	.....	1.85
21. Rebush and fit pins	1.0	13.95	16.55	1.0	13.95	16.55
22. Fit rod bearings	.8	16.50	18.55	.8	16.50	18.55
23. Assemble pistons on rods	.6	.....	1.60	.6	.....	1.60
24. Clean and resize pistons	.7	.....	1.75	.4	65.90	66.90
25. Regroove pistons	.4	36.20	37.25	.2	37.35	37.90
26. Clean and resurface sealing surfaces	5.0	.....	12.35	5.0	.....	12.35
27. Assemble engine	8.5	13.70	35.70	8.5	27.20	49.20
28. Run in and test	3.0	2.45	10.35	3.0	2.45	10.35
29 Reinstall in bus, test all lines and drives	14.0	.....	36.90	14.0	.....	36.90
GRAND TOTALS	**85.5**	**$216.15**	**$437.20**	**95.6**	**$297.40**	**$544.80**

COSTS OF EACH OVERHAUL OPERATION, both on the sample engine and on the average engine to be overhauled, are shown in the table above. Cost figures include labor charges, based on NFT's rates, and the cost of material required.

SMOKE TEST takes 30 minutes, and at converted rates, costs NFT $1.30.

CLEANING AND DYE-CHECKING the crankshaft takes 1.7 hours, costs $4.45.

Total Costs

By William W. Kunz
Superintendent of Equipment
Niagara Frontier Transit System

AT NIAGARA FRONTIER TRANSIT we started about a year ago to keep records of labor and material costs in connection with the overhauling of the Mack END 672 diesel engine.

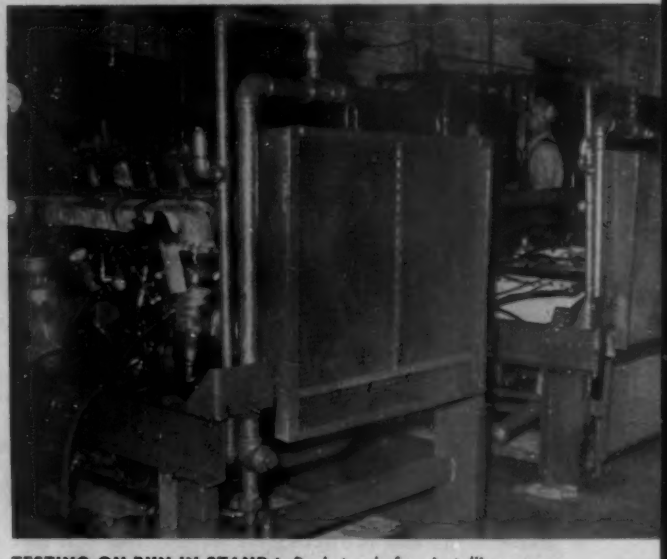
We have 300 of these engines in operation, and since these buses first went into service each has averaged well over 250,000 miles.

We remove our engines for overhaul on the basis of oil consumption and the number of miles operated—60 miles per make-up-quart being

ENGINE AND TRANSMISSION are pulled as a unit with a Ruger hoist. Total time is 6.3 hours at a cost of $16.55.

GRINDING VALVE SEATS and assembling and testing heads took 9.2 hours on the sample engine . . . cost a total of $28.50.

REHONING CYLINDERS costs Niagara Frontier Transit an average of $9.80 . . . takes a total of 3.8 labor hours.



TESTING ON RUN-IN STAND is final step before installing overhauled engine on bus. Time is three hours, cost $10.35.

# of Overhauling a Diesel Engine

the former point and 100,000 mi. the latter. At this mileage point, the engine normally will have been re-rung twice. Rather than re-ringing again it is our practice to overhaul the unit.

On engines with less than 100,000 mi., and where the first re-ring job shows no abnormal wear, we re-ring again.

The condemning point of 60 mi. per quart of oil was selected because we find that otherwise we get too much smoke for good public relations. And although the amount of smoke is checked visually by the garage foreman, we back him up from time to time with a test on a smoke meter.

The time required to make this test is 30 minutes or, converted into cost at our rates, $1.30. However, this procedure is not followed with every bus, but only on borderline cases where there is some question as to whether smoke is excessive.

Cost and time records are kept on every operation in the overhaul of an engine from this point on. Once it's determined that an engine needs overhaul, the bus is brought to our central repair shop and the engine and transmission are pulled as a unit with a Ruger hoist. Total time: 6.3 hours or $16.55, broken down into three separate steps, (Nos. two, three and four on the table.)

In the final step of the three, the engine is placed on a carrier rack on which it is transported to steam cleaning and finally to the stripping station where the transmission, generator, starter and other accessories are sent through their own repair cycles.

Work then begins on the engine itself. Class "C" mechanics strip the engine and place removed parts in baskets. After cleaning, they are placed in special racks containing all

Continued on next page

the parts for rebuilding an engine and are towed by electric truck to the engine rebuilding shop. The "C" mechanics do not determine which parts are to be re-used or which are to be reclaimed. That is decided by the engine rebuilder.

The total time required to strip and clean every part of the engine block and valve gear, place all parts in the rack and deliver to the rebuilder is nine hours or $24.20, which includes $1.80 for cleaning materials.

The engine rebuilder decides which parts are to be re-used and which are to be reclaimed. Time involved is 2.2 hours; cost: $5.80.

Next procedure is testing and inspecting the block. Time 2.5 hours; cost: $6.45.

For purposes of comparison we have listed on the table two sets of figures: those covering the cost of overhauling a sample engine and those we normally encounter in an average engine.

In the next step the engine blocks are rebored. However, the sample engine required resleeving which increased the cost $89.20 for the sleeves. Reboring takes 8.5 hours, costs $21.95. Resleeving takes 1.5 hours, but with the cost of sleeves added, total cost mounts to $93.05.

After resleeving, the sample block was honed. Time 2.5 hours; cost: $6.45.

On an average, the cost of reconditioning a block is $74.85, since we rebore 50 per cent of the blocks. With resleeving the cost is $105.95.

Head reconditioning at NFT usually requires resurfacing and installation of valve inserts, neither of which was needed with the sample engine. In resurfacing, time consumed for a pair of heads is one hour, or $2.60. Inserts require 2.2 hours without grinding, plus $18.90 for the inserts, for a total cost of $24.60.

Valve guides are checked and replaced, valves are ground, rocker arm bushings are renewed and the head is tested. Total cost, including material: $28.50 on our sample engine.

Ordinarily it is necessary to surface grind the heads and also to provide several new valves, guides and springs. On an average, it requires 11.5 hours plus $35.20 for materials, or a total of $59.95.

In the case of our sample engine the cam shaft was checked and only one lobe had to be reground. Time: 1.8 hours; cost: $4.75. This was less than average, because normally we find it necessary to refinish at least two lobes, and one of these may require some building up at a cost of 3.5 hours, plus 55 cents for a welding rod. Total cost for reconditioning an average cam shaft is $9.70.

Crankshafts are reground after straightening and dye checking. On the sample engine this took eight hours or $20.90, slightly lower than average. The sample shaft had no burrs on the centers requiring recentering. The average shaft takes a half hour more in time, or a total of $22.55.

Installation of new main and cam shaft bearings was also lower on the sample engine than is usually encountered. Generally we find that all new main and camshaft bearings are needed. Comparison of total costs was thus: Sample engine, $52.35; average engine $64.35.

Connecting rods are straightened, rebored and fitted with bearings in 1.5 hours, while the installation of piston pin bushings and fitting to the pins takes another hour. Assembly of pistons on rods consumes about 35 minutes.

The total cost of reconditioning a set of rods is 3.1 hours and $30.45 in material—a total of $38.55.

When it comes to reconditioning pistons, we are sometimes able to keep costs down by re-sizing pistons if they're to be used in a resleeved block. In other words, some of the additional costs of relining the block were taken up by the practice of resizing pistons instead of replacing them with new ones and spacers.

Resized pistons require regrooving, however, and the two steps take 1.1 hours or a total cost, including a set of rings, of $39.00. An average piston reconditioning job costs us .6 hours labor plus $103.25 for pistons, rings and spacers for a total cost of $106.40.

Various engine parts such as the manifolds, oil filter, oil pan, valve cover and bell housing must be checked for tightness and sealing ability. The total time required for these operations is about five hours, or a cost of $12.35.

With all the components reconditioned and in the assembly rack the engine rebuilder was ready to reassemble the sample engine. This operation took 8.5 hours and a material cost—for gaskets—of $13.70—a total of $35.70.

Once again this is slightly less than average cost, since valve lifters and the starter mounting did not require replacement, as is usually the case. When they are replaced an additional $27.70 is charged to materials, bringing total costs up.

The final step in our engine overhaul procedure is installing and testing it in the running-in stand. During this check all fittings and parts are tested for tightness under load to insure peak performance when installed. This entire operation requires three hours and an oil and gas cost of $2.45, a total cost of $10.35.

To install the engine in the bus, restore compartment panels and braces, and test all connections requires 14 hours at a cost of $36.90.

Thus, from the smoke test to installation in the bus 85.5 hours were expended and materials worth $216.15 were used, for a total cost, including all overhead, of $437.20. This particular engine, therefore cost somewhat less than the average. Normal overhaul requires 95.6 hours and $297.40 in material for a total of $544.80.

That is the figure we have found to be our average cost as far as overhauling a diesel engine goes. But naturally, as the variation in our sample engine shows, there is nothing inflexible in that cost.

However, it serves very well as a basis of comparison, or norm, against which we can check any particular engine overhaul job to see that it stays within a reasonable range of our standard figure.

If it doesn't—and there's no reasonable explanation for the discrepancy — we know that something is wrong somewhere. Armed with our detailed cost breakdown, it's not too hard a job to find out what it is and correct it.

"From smoke test to installation of the overhauled engine in the bus, we have a complete breakdown of costs. If one operation is out of line, cost or time-wise, it's not too hard to find the reason for it and correct it."

SOME IDEA OF THE VAST PARTS INVENTORY necessary to keep a fleet of buses rolling is given by this partial view of a bus company stock room. The bus industry spent $555,000,000 last year on new buses, fuel and oil, maintenance materials and tires.

1956 Buyers' Guide

BUS TRANSPORTATION again presents its authoritative source of "where to buy" information on parts, materials, accessories, shop equipment and tools. You'll find more than 1,600 manufacturers of some 350 products on the following pages.

VEHICLE, BODY, CHASSIS MANUFACTURERS

Associated Equipment Co., Ltd., Southall, Middlesex, England
*Beck & Co., C. D., Sidney, Ohio
*Berliet, 26 Rue de la Pepiniere, Paris 8, France
*Blue Bird Body Co., Fort Valley, Ga.
Carpenter Body Works, Mitchell, Ind., (Bodies)
Chevrolet Motor, Div. GMC, Detroit, Mich. (Chassis)
Coachette Co., Dallas 18, Texas
Corbitt Co., Henderson, N. C.
*Crown Body & Coach Corp., Los Angeles 21, Cal. (Bodies)
Dodge Brothers Corp., Detroit, Mich. (Chassis)
*Fitzjohn Coach Co., Muskegon, Mich.
*Fixible Co., Loudonville, Ohio
*G.M.C. Truck & Coach Div., G.M.C., Pontiac, Mich.
Hackney Bros., Inc., Wilson, N. C.
Intercontinental Mfg. Co., 1819 Broadway, New York, N. Y.
International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill. (Chassis)
Kenworth Motor Truck Corp., Seattle, Wash.
Leyland Motors, Ltd., Lancashire, England
*Mack Mfg. Corp., Empire State Bldg., New York 1, N. Y.
Madsen Eqpt. Co., Inc., Jay; Bath, N.Y.
*Marmon-Herrington Co., Indianapolis 7, Ind.
*Metropolitan-Cammell-Weymann Motor Bodies, Ltd., Westminster, England
National Coach Mfg. Co., Beaver Falls, Pa. (Beaver Coach)
Oneida Products Corp., Canastota, N. Y.
Pacific Car & Foundry Co., Renton, Wash.
*Pullman Standard Car Mfg. Co., 79 E. Adams St., Chicago, Ill.
Queen City Chevrolet Co., Cincinnati, Ohio
*Reo Motors, Inc., Lansing, Mich.
*St. Louis Car Co., St. Louis, Mo.
Shop of Siebert, Inc., Toledo 2, Ohio
*Southern Coach Mfg. Co., Evergreen, Ala.
Superior Coach Corp., Lima, Ohio
*Twin Coach Co., Kent, Ohio
*Utility Truck Distributors, Union City, Ind. (Bodies)
*Ward Body Works, 4201 S. Congress Ave., Austin, Texas (Bodies)
*Wayne Works, Richmond, Ind.
White Motor Co., Cleveland 1, Ohio

Manufacturers whose products are described in the advertising pages of this or previous issues during the past year.

ENGINES, MANUFACTURERS of

Air Cooled Motors, Inc., Syracuse, N. Y.
Buda Co., Div. of Allis Chalmers Co. Harvey, Ill.
Chrysler Corp., Industrial Engine Div., Detroit 14, Mich.
*Continental Motors Corp., Muskegon, Mich.
*Cummins Engine Co., Columbus, Ind.
Detroit Diesel Engine Div., General Motors Corp., Detroit 23, Mich.
*Fageol Products Co., Kent, Ohio
*General Motors Truck & Coach Div. General Motors Corp. Pontiac, Mich.
Hall-Scott Motor Car Co., Berkeley, Calif.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis.
Hercules Motors Corp., Canton 2, Ohio
International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.
*LeRoi Co., Milwaukee 4, Wis.
Lycoming Div., Aviation Corp., Williamsport, Pa.

Continued on next page

*Mack Mfg., Empire State Bldg., N. Y. C.
*Twin Coach Co., Kent, Ohio
Waukesha Motor Co., Waukesha, Wis.
Wisconsin Motor Corp., Milwaukee, Wis.

AIR CONDITIONING EQUIPMENT (For Buses)

Anemostat Corp. of America, 10 E. 39th St., New York 16, N. Y.
Carrier Corp., Syracuse 1, N. Y.
Continental Motors Corp., Muskegon, Mich.
Ellis-Watts, Cincinnati 36, Ohio
Frigidaire Div. General Motors Corp., Dayton 1, Ohio
Keco Industries, 2832 Spring Grove, Cincinnati, Ohio
Sundstrand Hydraulic Div., Rockford, Ill.
Trane Co., La Crosse, Wis.
*Tropic-Aire Inc., 5201 W. 65 St., Chicago 38, Ill.
York Corp., York, Pa.
*Vapor Heating Corp., Railway Exchange, Chicago 4, Ill.

AXLES, MANUFACTURERS of REAR

*Clark Equipment Co., Buchanan, Mich.
Eaton Mfg. Co., Cleveland 10, Ohio
Shuler Axle Co., Louisville, Ky.
*Spicer Mfg. Div. of Dana Corp., Toledo 1, Ohio
*Timken-Detroit Axle Div., Detroit, Mich.

ACCESSORIES, PARTS AND SUPPLIES

ACETYLENE—See Oxygen and Gas, Compressed

ADVERTISING—See Cards, Car

AIR CLEANERS—See Cleaners, Air

AIR-SPRINGS—See Shock-Absorbers

AMPLIFIERS—Mobile

*Midwest Audio Services, Box 345, Park Ridge, Ill.

ANTI-FREEZE

Commercial Solvents Corp., 17 E. 42nd St., New York, N. Y.
*du Pont de Nemours & Co., E. I., Wilmington, Del.
*Hollingshead Corp., R. M., Camden, N. J.
National Carbon Co., E. 42nd St., New York 17, N. Y. ("Prestone" "Trek")
Penna. Refining Co., Cleveland 4, Ohio
Publicker Com'l Alcohol Co., Philadelphia, Pa.
*Socony-Vacuum Oil Co., 26 Broadway, New York, N. Y.
Stanley Co., J. T., 642 W. 30th St., New York 16, N. Y.
U. S. Industrial Chemicals Div., Olin-Mathieson Corp., Baltimore, Md.

ANTI-GASSERS

Baron Industries, 241 W. Ave., 26 Los Angeles, Calif.
Fageol Co., R. D., Detroit, Mich.
*National Pneumatic Co., Boston, Mass.
*Zenith Carburetor Div., Bendix Aviation Corp., Detroit, Mich.

AXLES—See Shafts, Axle and Propeller

BATTERIES, STORAGE

American Bosch Corp., Sprigfield, Mass.
*Auto-Lite Battery Corp., Toledo 1, Ohio
*Bowers Battery & Spark Plug Co., Reading, Pa.
Carlile & Doughty, Inc., Conshohocken, Pa.
*Delco-Remy Div., General Motors Corp., Anderson, Ind.
East Penn Mfg. Co., Lyons Sta., Pa.
*Electric Storage Battery Co., Philadelphia 32, Pa.
*Firestone Tire & Rubber Co., Akron 17, Ohio
*General Tire & Rubber Co., Akron, Ohio
Gill Elec. Mfg. Co., Redlands, Calif.
Globe-Union, Inc., Milwaukee, Wis.
*Goodrich Co., B. F., Akron 18, Ohio
*Goodyear Tire & Rubber Co., Akron, Ohio
Gould Storage Battery Corp., Depew, N. Y.
Hicks Battery Co., Columbus, Ga.
Hobbs Battery Co., San Francisco, Calif.
Kathanode Corp., St. Paul, Minn.
*Laher Battery Production Corp., 2619 Magnolia St., Oakland, Calif.
Prest-O-Lite Battery Co., Toledo, Ohio
Sonotone Corp., Elmsford, N. Y.
States Batteries Ltd., San Francisco, Calif.
Surrette Storage Battery Co., Salem, Mass.
*U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.
Vesta Consolidated, Inc., 400 W. Madison St., Chicago, Ill.
Volta Battery, Chicago, Ill.
*Willard Storage Battery Div., Cleveland 1 Ohio
Witherbee Storage Battery Co., Hamburg Pa.

BATTERY TERMINALS—See Terminals

BEARINGS and BUSHINGS, BRONZE BRONZE-BACKED and DIE CAST

*A. C. Spark Plug Div., General Motors Corp., Flint, Mich.
Automotive Products Corp., Cincinnati 25, Ohio
*Clevite Service Inc., Cleveland, Ohio
Detroit Aluminum & Brass Corp., Detroit 11, Ohio
Dura-Bond Engine Parts Co., Palo Alto, Calif.
*Federal-Mogul Corp., Detroit 13, Mich.
Gardiner Metal Co., 2514 W. 48th Pl., Chicago, Ill.
Johnson Bronze Co., New Castle, Pa.
McQuay-Norris Mfg. Co., St. Louis, Mo.
*Moraine Products, Div. G.M.C., Dayton, Ohio
Morris Co., J. Leslie, 4225 Whiteside, Los Angeles 33, Calif.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
Thompson Products, Inc., Cleveland 3, Ohio
Toledo Steel Products Co., Cleveland 3, Ohio

BEARINGS, BALL

Aetna Ball Bearing Mfg. Co., 4600 Schubert Ave., Chicago 39, Ill.
Ahlberg Bearing Co., 3025 W. 47th St., Chicago, Ill.
Ball & Roller Bearing Co., Danbury, Conn.
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearings Co., Poughkeepsie, N. Y.
*Federal Mogul Corp., (Bower) Detroit, Mich.
General Motive Parts Co., 160 W. 62nd St., New York, N. Y.
Hoover Ball Bearings Co., Ann Arbor, Mich.
Marlin-Rockwell Corp., Jamestown, N. Y.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffman Bearings Corp., Stamford, Conn.
S.K.F. Industries, Inc., Philadelphia 34, Pa.
Torrington Co., Torrington, Conn.

BEARINGS, ROLLER

Bantam Bearings Corp., South Bend, Ind.
Dura Bond Bearing Co., 715 Loma Verde Ave., Palo Alto, Calif.
*Federal Mogul Corp., (Bower) Detroit, Mich.
Federal Mogul Corp., (B.C.A. Div.) Detroit, Mich.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Orange Roller Bearing Co., Orange, N. J.
Raritan Bearing Corp., Trenton 4, N. J.
Roller Bearing Co. of America, Trenton, N. J.
Shafer Bearing Corp., 35 E. Wacker Dr., Chicago, Ill.
S.K.F. Industries, Inc., Philadelphia 34, Pa.
*Timken Roller Bearing Co., Canton 6, Ohio
Tyson Bearing Corp., Massillon, Ohio

BELLS and BUZZERS, PASSENGER SIGNAL—See Signals, Passenger Stop

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Asbestos Mfg. Co., Huntington, Ind.
Atlas Asbestos Co., N. Wales, Pa.
Continental Rubber Works, Erie, Pa.
Dayton Rubber Mfg. Co., Dayton, Ohio
*Firestone Tire & Rubber Co., Akron, Ohio
*Gates Rubber Co., Denver 17, Colo.
*Goodrich Co., B. F., Akron 18, Ohio
*Goodyear Tire & Rubber Co., Akron 16, Ohio
Graton & Knight Co., Worcester 4, Mass.
*Grey-Rock Div., Raybestos-Manhattan, Manheim, Pa.
Haywood Industries, Dayton, Ohio
Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., Passaic, N. J.
*Raybestos Div., Raybestos-Manhattan, Inc., Bridgeport, Conn.
Russell Mfg. Co., Middletown, Conn.
*Thermoid Co., Trenton, N. J.

BELT, SEAT

Rose Mfg. Co., 2700 W. Barberry, Denver 2, Colo.

BLOCKS, BRAKE—See Lining and Blocks, Brake

BOXES, FARE—See Registers and Devices, Fare Collecting

BRAKES, AIR, HYDRAULIC and VACUUM

Aireon Corp., Kansas City, Kan.
*American Chain & Cable Co., Auto & Aircraft Div., Detroit, Mich.
Auto Specialty & Mfg. Co., St. Joseph, Mich.
*Bendix Products Div. Bendix Aviation Corp., South Bend, Ind.
*Bendix-Westinghouse Automotive Air Brake Co., Elyria, Ohio
Edelmann & Co., E. 2332 W. Logan Blvd., Chicago, Ill.
Empire Electric Brake Co., Newark 7, N. J.
Lambert Disc Brakes Div., Auto Specialties Mfg. Co., Hartford, Mich.
Lathan Co., San Francisco, Calif.
*Midland Steel Products Co., Detroit, Mich.
*Timken-Detroit Axle Div., Ashtabula, Ohio
*Vickers, Inc., Detroit 32, Mich.
*Wagner Elec. Corp., St. Louis 14, Mo.
Warner Electric Brake Mfg. Co., Beloit, Wis.
*Westinghouse Air Brake Co., Wilmerding, Pa.

BRAKES, AUTOMATIC ADJUSTERS

*Trucksville Brake Co., Trucksville, Pa.

BRAKE-FLUID—See Fluid, Hydraulic Brake

BRAKE DRUMS—See Drums, Brake

BUSHINGS—See Bearings and Bushings

BUSHINGS, THREAD REPAIR

*Heli-Coil Corp., Danbury, Conn.

BUZZERS—See Signals; Passenger Stop

CABINETS, FIRST AID—See Kits, First Aid

CABLE, IGNITION, STARTING, LIGHTING

American Enameled Magnet Wire Div. Electric Auto-Lite Co., Port Huron, Mich.
Belden Mfg. Co., 4689 W. Van Buren St., Chicago, Ill.
Caldwell Industries, Kent, Ohio
Crescent Co., Pawtucket, R. I.
*Electric Auto-Lite Co., Toledo 1, Ohio
General Electric Co., Bridgeport, Conn.
Kem Mfg. Co., Fair Lawn, N. J.
Kerite Co., 30 Church St., N. Y., N. Y.
Okonite Co., Passaic, N. J.
P & D Mfg. Co., Long Island City, N. Y.
*Packard Electric Div. General Motors Corp., Warren, Ohio
Rockbestos Products Corp., New Haven 4, Conn.
Standard Motors Products, Inc., Long Island City, N. Y.
Whitaker Battery Supply Co., Kansas City, Mo.
*Willard Storage Battery Co., Cleveland 1, Ohio

CARBURETORS

*American Liquid Gas Corp., Los Angeles 21, Calif.

Bendix Products Corp., Stromberg Carburetor Div., South Bend, Ind.
Carter-Carburetor Corp., St. Louis 7, Mo.
Century Gas Eqpt. Co., 11188 Long Beach Blvd., Lynwood, Calif.
Chandler Evans Co., Meridan, Conn.
Dix Mfg. Co., Los Angeles 23, Calif.
Eclipse Machine Div., Bendix Aviation Corp., Elmira, N. Y.
Ensign Carburetor Co., Huntington Park, Calif.
Holley Carburetor Co., Detroit, Mich.
J. & S. Carburetor Co., Dallas 2, Texas
Marvel-Schebler Prod., Div. Borg-Warner Corp., Decatur, Ill.
Parkdale Co., Los Angeles 65, Calif.
Rochester Products Div., General Motors Corp., Rochester, N. Y.
Tillotson Mfg. Co., Toledo, Ohio
United Motor Service, Detroit 2, Mich.
*Zenith Carburetor Div. Bendix Aviation Corp., Detroit, Mich.

CARDS, CAR

Car-Cards, Inc., 415 Lexington Ave., New York City, N. Y.
Chicago Car Advertising Co., 333 N. Michigan Ave., Chicago, Ill.
Loomis Advertising Co., St. Louis 1, Mo.
National Transitads, 400 N. Michigan Ave., Chicago, Ill.
Nation Wide Bus Advertising Inc., 220 E. 42 St., New York City, N. Y.

CASTINGS, CYLINDER SLEEVE (For Repairs)

Eagle Machine Co., Indianapolis, Ind.
Hunt Spiller Mfg. Corp., Boston, Mass.
McQuay-Norris Mfg. Co., St. Louis, Mo.
Nitriliner Co., 4735 S. Talman Ave., Chicago 32, Ill.
*Sealed Power Corp., Muskegon, Mich.
Thompson Products, Inc., Cleveland 3, Ohio
*Toledo Steel Products Co., Toledo 1, Ohio

CEMENT, GASKET

Cabot, Inc., Samuel, Boston, Mass.
Durkee-Atwood Co., Minneapolis, Minn.
*Hollingshead Corp., R. M., Camden, N. J.
Miller Mfg. Co., Camden, N. J.
Pep Mfg. Co., 33 W. 42nd St., New York, N. Y.
Permatex Co., Brooklyn 35, N. Y.
Stanley Co., John T., 642 W. 30th St., New York 16, N. Y.
Wilbur & Williams Co., Boston, Mass.

CHAINS, TIMING

Baldwin-Duckworth Div. Chain Belt Co., Springfield, Mass.
Cloyes Gear Works, Cleveland, Ohio
D & B Mfg. Co., 2335 S. Michigan Ave., Chicago 1, Ill.
Hoof Products Co., 6543 S. Laramie Ave., Chicago 38, Ill.
Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.
Morse Chain Co., Ithaca, N. Y.
Whitney Chain & Mfg. Co., Hartford, Conn.

CHAINS, TIRE and ANTI-SKID

*American Chain & Cable Co., York, Pa.
Bridgeport Chain & Mfg. Co., Bridgeport, Conn.
Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Hodell Chain Co., Cleveland, Ohio
International Chain & Mfg. Co., York, Pa.
McKay Co., Pittsburgh 23, Pa.
Peerless Chain, Winona, Minn.
Republic Steel Corp., Cleveland, Ohio
Roll-O-Matic Chain Co., Kansas City, Mo.
Round California Chain Mfg. Co., So. San Francisco & Los Angeles 4, Cal.
Round Chain Mfg. Co., Chicago 6, Ill.
Seattle Chain Mfg. Co., Seattle 8, Wash.
Southern Chain & Mfg. Co., Birmingham 5, Ala.
Taylor Chain Co., S. G., Hammond, Ind.
Western Chain Prod. Co., 1809 W. Belmont, Chicago, Ill.
Woodhouse Chain Works, Trenton 7, N. J.

CHANNELS, FELT

American Felt Co., Glenville, Conn.
Armstrong Cork Co., Lancaster, Pa.
Booth Felt Co., Brooklyn, N. Y.
Felters Co., Boston, Mass.
Felt Products Mfg. Co., 1504 Carroll Ave., Chicago 7, Ill.
Hamilton-Wade Co., Brocton, Mass.
Pacific States Felt & Mfg. Co., San Francisco, Calif.
Western Felt Works, 4117 Ogden Ave., Chicago 23, Ill.

* This Asterisk . . .

. . . Prefixing the name of any manufacturer listed in the Buyers' Guide indicates more complete descriptions of this manufacturer's products appear in advertising pages of this or previous issues during the past year.

CHANNELS, METAL

Cowles & Co., New Haven, Conn.
Kirk & Blum Mfg. Co., Cincinnati 25, Ohio
Standard Products, Lexington, Ky.

CHANNELS, RUBBER

Bridgeport Fabrics, Inc., Bridgeport, Conn.
Dryden Rubber Co., 1014 S. Kildare Ave., Chicago, Ill.
General Tire & Rubber, Wabash, Ind.
*Inland Mfg. Co., Dayton, Ohio
Republic Rubber Div. Lee Rubber & Tire Corp., Youngstown, Ohio
Sponge Rubber Prod. Co., Derby, Conn.

CIRCUIT BREAKERS

Rohden Mfg. Co., 4739 Montrose Ave., Chicago 41, Ill.

CLAMPS, HOSE

American Stamping Co., Battle Creek, Mich.
Breeze Corp., Union, N. J.
Ideal Corp., 435 Liberty Ave., Brooklyn, N. Y.
Marman Products Co., 11214 Exposition W. Los Angeles, Calif.
Murray Corp., Towson, Md.
National Utilities Corp., 826 S. Arroyo Parkway, Pasadena, Calif.
Screw Machine Products Co., Providence, R. I.
Tinnerman Products, Inc., Cleveland 13, Ohio
Universal Industrial Corp., Hackensack, N. J.
Washburn Co., Worcester, Mass.
Wittek Mfg. Co., 4305 W. 24th Pl., Chicago, Ill.

CLEANERS, AIR

*A. C. Spark Plug Div., General Motors Corp., Flint, Mich.
Air-Maze Corp., Cleveland 5, Ohio
Burgess Battery Co., 500 W. Huron St., Chicago, Ill.
Donaldson Co., St. Paul, Minn.
Fram Corp., Providence 16, R. I.
Michiana Products Corp., Michigan City, Ind.
*Purolator Prod. Co., Rahway, N. J.
United Air Cleaner Co., 9705 Cottage Grove Ave., Chicago, Ill.
Vortox & Co., 141 S. Alexander St., Claremont, Calif.

CLUTCHES—See Facings, Clutch

COILS, IGNITION

American Bosch Corp., Springfield, Mass.
Automotive Specialty Corp., Brooklyn, N. Y.
*Delco-Remy Div., General Motors Corp., Anderson, Ind.
DSM Electric Co., 6209 Hamilton St., Detroit, Mich.
Echlin Mfg. Co., New Haven 5, Conn.
*Electric Auto-Lite Co., Toledo 1, Ohio
Kem Mfg. Co., Fairlawn, N. J.
Mallory Electric Co., Detroit 4, Mich.
Niehoff & Co., C. E., 4925 W. Lawrence Ave., Chicago, Ill.
P & D Mfg. Co., Long Island City, N. Y.
Standard Motor Products, Inc., Long Island City, N. Y.

COLLECTORS, FARE—See Registers and Devices, Fare Collecting

COMPOUNDS, PARTS CLEANING—See Solutions, Parts Cleaning

COMPOUNDS, RADIATOR CLEANING

Barbee Co., Louisville, Ky.
*Hollingshead Corp., R. M., Camden, N. J.
Hygienic Products Co., Canton, Ohio
Lusk Co., C. F., Cleveland, Ohio
*Magnus Chemical Co., Garwood, N. J.
Magnuson Prod. Corp., Brooklyn, N. Y.
Miller Mfg. Co., Camden, N. J.
*Oakite Products, Inc., 22 Thames St., New York 6, N. Y.
Penn Salt Mfg. Co., Philadelphia, Pa.
Petroleum Solvents Corp., 331 Madison Ave., New York 17, N. Y.
Radiator Specialty Co., Charlotte, N. C.
Warner-Patterson, Chicago, Ill.

COMPOUNDS, UPHOLSTERY CLEANING

Fayette Chemical Co., Uniontown, Pa.
*Magnus Chemical Co., Garwood, N. J.
*Oakite Products, Inc., 22 Thames St., New York 6, N. Y.
Sno-Flake Products Co., Detroit, Mich.

COMPOUNDS, VALVE GRINDING

Butcher Co., S. H., 3628 E. Olympic Blvd., Los Angeles 23, Calif.
Carborundum Co., Niagara Falls, N. Y.
Clover Mfg. Co., Norwalk, Conn.
Pep Mfg. Co., 33 W. 42nd St., New York 18, N. Y.
Zip Abrasive Co., Cleveland, Ohio

COMPOUNDS, WASHING—See Soap & Detergents

CONTROLS, CHOKE

Arens Controls, 2550 S. Halsted St., Chicago, Ill.
Bendix Products Corp., Stromberg Carburetor Div., South Bend, Ind.
Imperial Brass Co., Chicago, Ill.
Pierce Governor Co., Anderson, Ind.
Shakespeare Products Co., Kalamazoo, Mich.

CONTROLS, DASH

Arens Controls, 2550 S. Halsted St., Chicago, Ill.
Imperial Brass Mfg. Co., 1220 W. Harrison St., Chicago 7, Ill.
Richland Auto Parts Co., Mansfield, Ohio

CONTROLS, DOOR—See Operators, Pneumatic Door

CONTROLS, ENGINE HEAT—See Thermostats, Water Circulating—also Shutters, Radiator

CONTROLS, FUEL-FILLING

Modern Auto Supply Co., Syracuse, N. Y.
Protectoseal Co., 1958 S. Western Ave., Chicago 7, Ill.
Scully Signal Co., Cambridge, Mass.

CORD, BELL & SIGNAL

Jessall Plastics, Inc., Hartford, Conn.
Puritan Cordage Mills, Louisville, Ky.

COVERINGS, FLOOR

Acme Asbestos Covering & Flooring Co., 1300 W. Fulton St., Chicago 7, Ill.
American Mat Corp., Toledo, Ohio
Armstrong Cork Co., Lancaster, Pa. (Armoflor, Automat, Linoleum, Traffex)
Bird & Son, Inc., Walpole, Mass.
Congoleum-Nairn, Inc., Kearney, N. J. (Congoleum)
*Goodrich Co., B. F., Akron 18, Ohio
*Goodyear Tire & Rubber Co., Akron, Ohio
*Johns-Manville, 22 E. 40th St., New York 16, N. Y. (Composition)
Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., Passaic, N. J.
Melflex Products Co., Akron 8, Ohio
*Moore & Co., Sam, Mantua, Ohio
Pabco Products, Inc., San Francisco, Calif.
R. C. A. Rubber Co., Akron, Ohio
Sloan, W. & J., 5th Ave. & 47th St., New York, N. Y. (Carpet)
Tuco Products Corp., 30 Church St., New York, N. Y. (Composition)
*U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y. (Rubber Matting)

Continued on page 92

"School Buses—Why I Favor

A prominent New York State school bus operator takes exception to arguments advanced in favor of public operation of school buses . . . tells why he believes private operation is more efficient and more economical.

THE ADMINISTRATIVE HEADS of school districts are really like presidents of large corporations—they spend large sums of money each year . . . they work within budgets . . . they produce products.

And they range all over the graph in efficiency of cost, management and production.

For instance it's not unusual at all for the "president" of one of these corporations to pick up the phone and say to me: "I'm working on the budget. How much should I put in for transportation?" He really should be asking if his transportation system is efficient . . . if he's getting top dollar value . . . how much transportation he actually needs.

If he does think along these lines, he eventually must ask himself this question . . .

"Should we operate our own buses or buy school transportation?"

In other words, should the school buses be publicly or privately owned?

The yearbook of the National Education Association points out that this is a policy decision which must be made by every board of education.

It then goes on to list the "advantages" and "disadvantages" of each type of operation. By and large, the advantages of one are the disadvantages of the other, so let's look at the two advantages of the private contract systems which are pointed out in the yearbook.

"It relieves school officials of transportation management"

Since the private contractor owns the equipment, he is responsible for its maintenance and operation.

Conversely stated, public ownership "increases the management responsibilities of school officials in that they become responsible for maintaining and operating the buses."

I hold that this is a major disadvantage. The administrators I talk to tell me that they don't have enough time to do their jobs as well as they would like. In the face of this, should we contemplate saddling our school officials with the task of supervising bus operation? The per-bus cost charged by a private contractor is reasonable indeed when balanced against the danger of poor school administration caused by the additional burden of bus operation inflicted on an overworked staff.

School administrators are paid to produce education, not transportation. When they are forced out of their own field into another, something must suffer.

The second advantage listed for private operation is . . .

"Transportation costs are known at the start of the school year"

This is an important advantage. For when the private contractor submits his bid and it is accepted by the school board, the board knows exactly—to the penny—what must and will be spent for bus transportation during the next year.

If the contractor estimated too low, it's his problem, not the school board's.

Those are what the NEA yearbook lists as the advantages of private operation. Now let's look at what they call the "disadvantages" of the privately-owned system, or conversely, the "advantages" of public operation . . .

"Here are five advantages claimed for public operation"

All five of them are listed in the yearbook as disadvantages of the private contract system . . .

1. It generally costs more than public ownership and operation.

2. It's not as readily controlled by school officials, because of a "feeling of independence" on the part of drivers when they own the buses they drive.

3. High standards of service are harder to maintain, and control measures harder to enforce.

4. Maintenance of bus equipment in a safe condition is more difficult under private operation.

5. Private operation is not as flexible to changing conditions. When the annual contract is signed the contract system tends to be fixed for the year, regardless of changes in route conditions.

"When you analyze them, these 'advantages' just don't hold up"

Take the last one first. Why aren't privately-owned buses as flexible to changing conditions as publicly-owned ones? Unless the publicly-owned bus has some roads that the privately-owned bus doesn't know about, one is as flexible as the other.

Private Operation"

By Clarence Geiger • *President*
New York State School Bus Operators' Association

In my company we make at least one bus route change every day in our work. Would anybody have us believe that there is an administrator so foolish as to think he was not going to be forced to change his transportation during the year? Who would sign a contract so inflexible that he could not adapt to changing conditions?

Let's look at the next one . . .

"Maintenance of bus equipment in a safe condition is more difficult"

That is a really slanderous statement. Fortunately, though, the best defense against it is truth:

First, the buses of both systems are inspected periodically in New York State by motor inspectors of the Public Service Commission. These men are independent, competent and unimpeachable . . . and they inspect *all* school buses in the state with safety of children their primary concern.

Secondly, the private contractor's livelihood is tied up in his buses. He can't afford to let them deteriorate. He must maintain them . . . or lose money.

Let's take the next two together . . .

"High standards and tight control are easier with private operation"

I say this in spite of the fact that the NEA yearbook maintains just the opposite.

In the first place, service is the most important thing the owner-operator has to offer. Is he going to refuse it and put himself out of business?

As far as control goes, you have much more chance of getting it from the private operator than you have under any other system. Of course, the NEA may be right if school boards make no provision for control in their contracts. But after all, they write the bid specifications . . . they write the contracts.

The average contractor will welcome a specification that says drivers in any district are under district board control. I personally have never yet refused to remove a driver from a bus when requested to do so.

The driver is the board's employee . . . he must satisfy the board. But it's up to the board to say so in the bid specification. It should also tell the contractor what insurance it wants . . . what it expects in the way of extra-curricular trips . . . in short, everything it wants and does not want. Then it can be sure of getting them.

Now for the last one . . . the so-called "advantage" of public operation which we hear most about—lower cost.

"True costs of public operation are often lost in bookkeeping"

When I say this I am not in any way condemning the school administrator, or questioning the ethics of his bookkeeping. He is simply following prescribed methods.

Believe me, though, that you have to hire a CPA to dig out the costs of transportation in many district school budgets.

You may find that the cost of buses is not charged to transportation, but to bonded indebtedness.

You may find that the interest on bonds is not charged to transportation, but to interest.

You may find that bus insurance costs are not charged to transportation, but to the insurance account.

So when you add them all up, does public operation really cost less than private operation? In fact, does the average school administrator even know his total transportation costs?

The private operator does . . . he pays them all out of the income his buses bring in. Evidently some school administrators realize that they can buy his services cheaper than they can provide their own, for right in my own area of Long Island many districts in the past few years have started to contract for private equipment rather than purchase additional buses for their already existing publicly-owned systems.

I am certain that they did this only after investigating their costs and discovering that it was more economical for them to do so.

And private operators pay taxes, too. Our company paid more than $30,000 last year, not including income and excise taxes. Schools benefit from these taxes we paid in the form of state and federal aid, and the direct school tax.

Which is preferable—a private contractor, giving service at a saving, and paying taxes to support schools, or a more expensive publicly-owned system which does not support financially the schools it serves?

I can see no more justification in district ownership than I can see in an attempt on the part of districts to print their own text books, or produce their own electricity, or design their own schools, or build their own buildings . . . especially when it would cost them more money, and they'd get a lower-quality product.

Industry In Review

Senate, House Ponder Fate of Capital Transit

● Congressmen disagree on authority replacement for CTC and restoring liberalized franchise to Wolfson group.

• The fate of Capital Transit Co. is still up in the air although the Senate has approved a bill that would replace CTC with an authority in August.

As voted by the Senate, the authority would serve for a three-year interim period, during which the District Commissioners would search out possible private operators.

However, all this presupposes that the House of Representatives will follow suit and pass the authority bill. Strong opposition is expected there. There are some in the House who feel that a government move to run the transit system would constitute "socialism"—and in the capital of a country founded on capitalism.

As a result of such thinking, there is strong support for a House bill that would restore to CTC its franchise under greatly liberalized conditions.

It was expected that the two houses would have to get together to resolve the conflicts in legislation.

Under the Senate bill, the authority would be under the direction of the District Commissioners. It would get its start through a $20 million federal loan. And, as mentioned above, it would operate for three years, after which the system would revert to private ownership.

There was one big but. If no private operator were found within the three-year period, the authority would then become permanent.

Meanwhile, strong criticism was directed against the Senate bill by the National Association of Manufacturers. The NAM accused the Senate of establishing a dangerous precedent when, in voting in an authority, it exempted authority employees from the ban on strikes that now applies to other government workers.

The NAM said in effect that these employees should be made to take their grievances to Congress where their wages, hours and working conditions are fixed by law.

In another move, minority stockholders of CTC made an attempt to buy out Louis E. Wolfson, who controls CTC. But a CTC spokesman said that he felt it was too late to consider any plans except those pending in the legislature.

Along the same lines, it was announced that a group of Midwesterners headed by Wichita Transportation Corp. president John E. Ebinger was interested in the purchase of CTC, but only if the House bill succeeded in restoring the franchise. If the Senate bill is approved the group would probably withdraw, Ebinger said.

• *Ed. Note: In a later development, the House did pass a bill restoring CTC's franchise under greatly liberalized conditions.*

Frisco Studies Trolley Leasing Plan

• For those who thought the streetcar was all but dead comes word that San Francisco may extend its bus-leasing plan to trolleys.

The city wants 61 new streetcars, and representatives of the San Francisco Public Utilities Commission are negotiating with manufacturers to determine interest in a lease proposal.

These talks indicate there would be bidders, according to City Controller Harry D. Ross.

Ross said the streetcar proposal would be similar to the bus-leasing plan on which San Francisco Municipal Railway invited bids a year ago. The contract was awarded to Mack Motor Truck Corp. for lease of 100 buses initially and 70 additional coaches yearly for the succeeding five years.

The trolley-leasing proposal has not yet been approved by the Public Utilities Commission.

2,900 Sign for Lower Detroit Fares

• An estimated 2,900 senior citizens registered early last month to obtain passes to participate in a new Detroit Street Railways reduced-fare plan.

The program, which provides for a half-fare (ten as against 20 cents) during certain hours for those of 65 who are not gainfully employed, started on May 15 on a trial basis for four months.

Registration centers have been set up in 28 city libraries and others in the suburbs.

DSR secretary, W. B. Fitzgerald, administrator of the program, said he expected an enrollment of about 50,000 in the new plan by the end of last month. There are an estimated 200,000 men and women eligible for the reduced fares.

Oneida Safety Panel Judges Named

• Announcement of the judges' panel for the safety award contest being conducted by the Oneida Products Division of Henney Motor Co. has been made by C. W. Trout, sales vice president.

The judges who will select America's safest school bus drivers include Stephan James, director of the education division, Automotive Safety Foundation; Marion Telford, school transportation committee, National Safety Council, and Shelton Fisher, publisher, BUS TRANSPORTATION.

The nation's safest driver will receive a $500 Savings Bond, and the school or rental contractor he represents will be awarded a new 48-passenger Oneida school bus. Each state finalist will receive a $50 Savings Bond. Contest results are expected to be announced in the fall.

Higher Earnings Reported For "New" Fifth Ave. Coach

• A familiar name will adorn buses operating in New York City. The New York City Omnibus Corp. has become Fifth Avenue Coach Lines, the named carried by its subsidiary. Fifth Avenue Coach is the oldest bus firm in the city.

The name change was voted at the annual meeting of Omnibus stockholders. At the same time, President John E. McCarthy told stockholders that it was expected the company's earnings in 1956 would be even better than in 1955 when earnings were $2.85 a share.

First quarter earnings this year were 59 cents a share as compared to 43 cents a share in the first three months of last year.

Tacoma Votes Tax Aid

• The Tacoma, Wash., City Council has approved an ordinance under which the city leases the operating equipment of the Tacoma Transit Co., to save the transit company some $90,000 a year in taxes.

The approval was voted after the council became convinced the employee-owned company either would have to curtail service or raise fares, because of declining revenue.

Businessmen Buy Bus Line

• A citizen's group in Vallejo, Calif., has purchased the municipally-owned transportation system abandoned by the city on May 1.

A group of businessmen has formed the Vallejo Citizens Transit Co. . . . purchased ten 1954 diesel buses for $26,200 and leased other facilities from the city. After formation of the corporation, the group formed a partnership which included employees.

Bus Firm Gets School Bid

• Inter City Transit Co., of Danbury, Conn., has been awarded a five-year bus transportation contract by the New Canaan Board of Education, effective next September.

The new contract will mean an expenditure of $36,020 for the 1956-57 school term—a reduction of more than $7,000 under the figure estimated in the school budget.

Direct Mexico Run Is Set up

• Direct first-class bus travel between Denver, Colo., and Mexico City has been worked out by Continental Trailways and Mexico's Flecha Roja Bus Co. The run will take 52 hours and will have but one change at El Paso, Tex.

A group of 30 officials of the Mexican bus company were the guests last month of Continental on a two-day tour of Denver. At that time, they rode various types of equipment to determine the best type of bus for mountain travel such as found in Mexico.

Shortly before, Continental Trailways representatives attended the opening of the Flecha Roja bus terminal at Juarez, Mexico, just across the border from El Paso.

Although the new run can be made directly, it was suggested by the sales director for the two companies that passengers make at least two stops so they could enjoy the natural beauties of the route.

MTC to Sell Bonds

• The Montreal Transportation Commission will call for tenders shortly for $11½ million 4½ per cent 20-year serial bonds and will use a share of the proceeds, $6 million, for 250 new buses.

The first of the new vehicles were delivered on Apr. 1 and the rest will be received throughout 1956.

In addition, $2 million will be spent for repair shop extension, $1 million for a storage garage and other amounts for paying for 75 other buses bought last fall.

Pollard Donates $1,000

• The first voluntary contribution to the American Transit Associations Public Information program has been sent in by Warren R. Pollard, president of the Virginia Transit Co. It was a check for $1,000.

At least $3,500 additional is pledged, said ATA's Public Relations Division, which worked on details of the program, toward the $65,000 goal. The funds will be used to pay for a series of 13 institutional advertisements in the magazine, "U.S. News & World Report."

Texas Gets Terminal on Bus Birthday

Celebrating 21 years in Abilene, Tex., Continental Trailways recently opened its ultra modern $55,000 bus terminal. The building will be open 24 hours a day, seven days a week, said G. L. Thorne, Continental agent. Finished in subdued shades of green, saddle tan and copper, the building will be as modern as the Flxible two-level bus parked at the curb. Parked in the driveway is an old White sightseeing bus, painted yellow and black by Continental and appropriately called the "Yellow Jacket."

MAINTENANCE MEN on the hoof tour the 30-acre plant of the Baltimore Transit Co. during the ATA meeting.

FROM DELAWARE COACH and S. Penn. A. J. Holt, R. R. Woodrow, C. T. Foster, Jr., E. J. Kotz, J. S. Wanstall, J. Conway.

THE PELLISIERS, L.D., Jr., E.A. of Columbus; their sister, Mrs. Frazier; Mrs. L. D. Pellisier Jr., and J. H. McManus attended.

ON VISIT from Puerto Rico were Mr. and Mrs. Max Dach. He's from Puerto Rico Transportation Authority. Right, F. V. Casey.

280 Turn out for ATA Baltimore Meeting

• Approximately 280 transit men and women, manufacturers and guests turned out at Baltimore May 2-4 to make the American Transit Association's regional and divisional conferences a success.

"How to operate at a profit" and "How to cut costs" were the twin themes of the three-day conference.

Keynoting the opening session and speaking with high optimism, ATA president Roswell F. Thoma, president of Niagara Frontier Transit System of Buffalo said:

"I believe in the future of transit and that we who operate transit have in our power to shape the industry's future and to make a reasonable profit in the process."

Thoma said the industry "must apply a positive approach — must make it clear that our business is inseparable from a healthy local economy, especially downtown—that cities can use transit in a positive manner to alleviate traffic congestion, to save millions in costs of new and altered facilities, and to restore to city streets their proper function of moving people."

All of the conference sessions were in the form of candid roundtable discussions with audience participation. Among the groups which held mid-year meetings at Baltimore were: claims, accounting, purchases and stores divisions and a conference on scheduling by eastern operators.

A feature of the maintenance session was an inspection trip through the newly renovated shops of Baltimore Transit. About 75 took the two hour, three mile hike through the plant.

Awards for outstanding achievement in safety were made to 32 transit companies. Some 116 companies participated in this competition which is one of the oldest in the safety field.

Presentation was made by Cyril Ainsworth, president American Museum of Safety. Silver plaques, representing top honors, went to Capital Transit, San Diego Transit, Phoenix (Ariz.) Transit, South Carolina Electric and Gas, (Columbia and Charleston), Safety Motor Transit, (Roanoke), Anderson (Ind.) City Lines. Capital Transit has won 13 straight awards and Columbia eleven —all top awards.

A recommendation by the Public Relations Division for a series of 13 "public information" advertisements in "U. S. News & World Report" was endorsed by the ATA board of directors. Under the plan, the cost of the advertisements is to be financed by voluntary contributions from both operating and associate members of ATA.

Production of a sound slidefilm to train operators in courteous handling of passengers also was approved by the board of directors. The film would portray especially trying situations met daily by operators of transit vehicles and supply a series of what-to-do-about it answers.

The Fare Box

• Here is a spot-check of the current fare picture throughout the country. The following are those fare increases which have recently been requested or approved.

Increases Asked

Shreveport Railways Co., La. • Asked an increase from five tickets for 60 cents to five for 65 cents. Wants school tickets up from four to six cents and round-trip zone tickets from 15 to 20 cents.

Bloomington-Normal City Lines, Ill. • Filed second petition to replace token fares with straight 15-cent cash fare; children's fares from five to ten cents.

Metropolitan Coach Lines, Calif. • Wants to increase fares on its 22 interurban lines five to 31 cents on runs of various lengths.

Lincoln City Lines, Neb. • Seeks to raise adult fares from four tokens for 50 cents to four tokens for 55 cents. Increase would be five cents.

Baltimore Transit Co., Md. • Wants PSC to continue 20-cent basic fare, plus right to sell children's tokens at two for 25 cents.

Louisiana Transit Co., La. • Seeks an increase of five, ten and 15-cents fares to ten, 15 and 20 cents on eight different routes. Proposal also calls for student tickets at ten for 75 cents in one zone, 10 for $1.25 in two zones and 10 for $1.75 in three zones.

Increases Granted

Beaumont City Lines, Tex. • Granted an increase from two tokens for 25 cents to a straight 15 cents, with transfers costing two cents.

City Coach Co., N. C. • Authorized to raise fares from ten to 12 cents.

Potter's Bus Line, Pa. • Will make a general five-cent increase in one-way cash fares and boost 10-trip tickets 25 per cent on routes in Mifflin and Juniata counties.

Denver Tramway Corp., Colo. • Granted permission to stop sale of tokens and to charge a straight 15 cent cash fare.

Four Independent Bus Lines, N. J. • Raised fares from ten to 12 cents for one zone and from 15 to 17 cents for two zones.

UTC Relief Plea Nixed

• The court has ruled against the United Transit Co., Providence, R.I., which had sought to end payment of one and a quarter per cent of gross revenues as a street railway corporation. UTC no longer operates trolleys, having abandoned them by 1952.

In its decision against UTC the court said, in effect, that the firm's only hope is to convince the state legislature that the original charter of 1919 should be amended.

The suit was a test case in which UTC hoped to recover about $91,000 it paid the state last year.

At the same time, UTC has filed new tariffs with the Public Utility Administrator which would up the present short haul zone cash fare from ten to 15 cents. Fares in other zones would increase accordingly, as would student fares.

However, UTC would also inaugurate a 25-cent "Thrift-Ride" card that would allow patrons to travel under the current fare.

Jack Garrett Scott Dies

• As reported in last month's Top Topics, Jack Garrett Scott, well known general counsel for the National Association of Motor Bus Operators, died last month at the age of 60.

Mr. Scott was a graduate of the University of Colorado and received his law degree in 1921 from the Universtiy of Denver. In 1933 he joined the NRA in Washington and was subsequently attorney for the Bureau of Motor Carriers, ICC.

During World War II, Mr. Scott was with the Office of Defense Transportation. He also served as Under Secretary of Commerce for Transportation before joining NAMBO.

NSC Praises NY Operator

• Carey Transportation, Inc., has come in for some high praise at the hands of the National Safety Council, which featured the New York City airport ground operator in an article in NSC's magazine "Public Safety."

As pointed out in the article, Carey recorded one of the finest records in transportation history, safely transporting 3,200,000 passengers in 1955 from New York air terminals to outlying airports for 30 domestic and international airlines.

Of 191 drivers on airport runs, 132 earned National Safety Council Safe Driver Awards in 1955.

Anniversary Handshake for Old Timer

The oldest employee in point of service with the Schenck Transportation Co. of Floral Park, N. Y., Donald Chichester is given the glad hand by President Howard E. Schenck, right, and VP L. E. Weidner, left, at the 30th anniversary employees' dinner given by the company last month. STC started in 1926 with four buses and 17 employees . . . today has 80 buses and 168 employees. Operating on Long Island, the company carries more than five million passengers yearly over seven major routes.

SEC Nixes Third Avenue Plan

• The Securities and Exchange Commission has turned thumbs down on the latest plan for reorganizing the bankrupt Third Avenue Transit Corp., and has advised the U.S. District Court to do the same.

The SEC's main objection to the plan advanced by Lester T. Doyle, Third Avenue trustee, was in its proposal to issue new income debentures. The regulatory agency suggested eliminating these debentures and substituting new common stock.

At the same time, the SEC advised the merger of Third Avenue with Surface Transportation, and improvements in the sinking fund for new first mortgage bonds.

In general, the SEC felt that the plan was fair in regard to present first mortgage bondholders and other creditors, but not to adjustment bondholders.

Under the plan, Third Avenue's adjustment bondholders would get 12 shares of new common stock for each $1,000 bond owned, plus rights to buy $100 principal amount of income debentures and 33.15 shares of new common stock at a price of $199.45.

The court may either accept the SEC's recommendations or approve a plan acceptable to Third Avenue's trustee and its creditors.

Auto Air Spring Announced

• The "bubble ride" familiar to many bus passengers may be in the not too distant future for automobile owners, according to an announcement by research engineers for the Goodyear Tire & Rubber Co., which has been working on air springs.

Like their bigger brothers on buses, automobile air springs would be self-leveling. This would lead to more accurate steering and greater handling ease. Car headlights will be aimed accurately and remain constant.

According to Goodyear, its air spring is designed so that manufacturers' installation costs are reduced.

Thomas Nicholl 62, Dies

• A well-known figure in the transit industry died last month. Thomas H. Nicholl, president of Lehigh Valley Transit Co. since last December and president of Pueblo and Colorado Springs Transit Companies, had been ill for some time.

Mr. Nicholl started his career in transit with the Union Traction Co. of Indiana. In World War II, he was a director of the Highway Transport Authority and as such was active in conservation of material.

Mr. Nicholl was also active in American Transit Assn. affairs, at one time serving as director.

NFT Honors 462 Safe Drivers

Perfect safety records stretching back at least five years won Niagara Frontier bus drivers an invitation to dinner and jeweled safety emblems, as well as gold watches and diamond emblems in the case of 30 men having ten-year perfect records. NFT President Roswell F. Thoma was host to the 462 drivers and their wives or husbands who attended. He also made the presentations. Leslie Spraggon, NFT vice president, was toastmaster. A Buffalo music hall was hired for the occasion.

Calendar of Events

A list of activities of interest to the bus industry.

June

17-19 Pennsylvania Bus Assn., 35th Annual Meeting, Galen Hall, Wernersville, Pa.

18-19 North Carolina Bus Assn., Inc., Annual Convention, Barringer Hotel, Charlotte, N.C.

27 Tri-State Maintenance Association, Irem Temple, Dallas, Penna.

27-30 New York State Motorbus Assn., annual summer meeting (four-day cruise).

August

1 N.J. Motor Bus Assoc. Outing Day, Blasberg's Grove, Hawthorne, N.J.

September

12-14 National Association of Motor Bus Operators, Drake Hotel, Chicago.

17-20 American Transit Association, Hotel Jefferson, St. Louis, Mo.

October

14-16 Joint Meeting—New England Bus Association, Intercity Bus Association and Northeastern Bus Traffic Association, Haddon Hall Hotel, Atlantic City, N.J.

22-26 44th National Safety Congress and Exposition, Conrad Hilton, Congress, Morrison and La Salle Hotels, Chicago, Ill.

City Girds for LTC Battle

• Another court battle is shaping up in the land of the julep where the city of Louisville has instituted a court suit to force fares on Louisville Transit Co. vehicles down to the pre-Jan. 1 level.

The city charges that Commissioner A. R. Steele of the State Department of Motor Transportation had not been in office sufficiently long to make a thorough study of the case before granting the increase. It also charged that Deputy Commissioner Delmar Ison was biased against the city.

An interim fare increase to 20 cents cash was ordered Jan. 1 when the court decided the previous fare was confiscatory.

Industry Briefs

An unofficial body composed of business and local government representatives has voted to take steps necessary to establish public ownership of mass transit facilities in the San Diego metropolitan area.

The group, the Metropolitan Transit Study Committee, formed three subcommittees, one to draft legislation, and the others to study financing and price determination of San Diego Transit System.

Arbitration will be used at Albany, N. Y., in an effort to break deadlocked wage negotiations between the United Traction Co. and its workers.

Union demands would cost the company "almost half a million dollars a year," said Thomas F. Riedy, UTC president. The company at one point proposed a division of all profits over six per cent among employees and stockholders.

National City Lines reported a first quarter consolidated net income of $738,652, equal to 53 cents per common share on the 1,392,063 shares outstanding.

Income from operations accounted for $647,971, and other income including dividends on investments in other partially-owned transportation companies amounted to $591,318. Other deductions claimed $500,637.

In the intercity field, the Greyhound Corp. reported a consolidated net loss of $249,902 for the first three months. It's due mainly to the seasonal nature of business, said Arthur S. Genet, Greyhound president.

Total operating revenues for the quarter were $48,360,779—$1,084,408 or 2.3 per cent ahead of last year. However, wages, materials and depreciation rose, too.

Motor vehicle registrations in 1955 were more than double the figure in 1945, the U.S. Department of Commerce reports.

A 7.2 per cent increase last year was the largest since 1950 . . . lifts the total registrations to 62,760,395 buses, trucks and cars.

A half-million dollar work stoppage suit has been filed by the Philadelphia Transportation Co. against the union representing 68 maintenance employees who walked off their jobs for one day.

The dispute, which had its foundation in the refusal of three men to dismantle overhead trolley wires in traffic, was resolved by an agreement to bring the matter to arbitration.

Low Fare Is a Money Loser

• The seven-cent fare of New Orleans Public Service may become a thing of the past. NOPSI reported a 1.9 drop in net income in 1955 which it attributed to declining transit revenues, and may have to seek relief.

Despite its seven-cent fare, the company has had a decline in patronage of 30 per cent in the past ten years. The same fare has been charged for more than 30 years.

Chamber Lauds Frisco's Muni

• San Francisco's Chamber of Commerce has given a pat on the back to the city's Municipal Railway in a detailed "Analysis and Report" to Frisco's Public Utilities Commission.

Muni, said the Chamber, should be placed in a favorable light in comparison with transit systems in other cities. It has showed "substantial progress in its efforts to serve the riding public" in the face of "almost insurmountable problems . . ."

"Finances and management were carefully scrutinized and the results are good. We feel that the public should know this," said the Chamber.

Pike Considerate of Bus Riders

• Hungry bus passengers traveling the Ohio Turnpike will be assured of quick food service at any of the 16 turnpike restaurants because of radio.

When a chartered or non-scheduled bus enters the turnpike a toll collector will inquire if an eating stop is planned. If so the collector calls a maintenance building nearest the restaurant chosen and the clerk there telephones the restaurant manager, giving him the number of passengers to expect. Restaurant personnel then have ample time to prepare for the group.

Trolley Makes Last Tunnel Run

Buses have taken the place of trolley cars on the run that took rail vehicles through Kansas City's historic "8th Street Tunnel." Despite chilly weather more than 3,000 people turned out to witness the final run through the tunnel built in 1888 and now making way for traffic and improved parking. City officials, civic leaders, transit officials and old timers took the last tunnel trolley ride.

NY Bus Man Marks 36th Anniversary

• A pioneer in the New York State bus industry has just completed his 36th year of operation. Leonard D. Dickinson, owner of L. D. Dickinson Motor Coach Lines, is said to be the oldest certified bus operator in the state, and he's still going strong.

Dickinson began his bus career in 1920 with a 16-passenger bus operating between Owego and Spencer, N. Y. Later he added an Owego-Ithaca route.

In addition to regular route operation, he operates a charter bus service which has been carrying school children for the past 25 years—as many as ten districts in one year.

Dickinson currently operates eight buses and finds his job a little easier than it was in 1920. Then, he would drive during the day and double in brass as a mechanic at night.

The company holds five PSC and ICC certificates and can operate throughout New York and the United States. Buses average somewhere in the neighborhood of 1,000 miles a day, Dickinson estimates.

Northland Greyhound Merger Voted

• A proposal to merge Northland Greyhound Lines into the Greyhound Corp. has been approved by stockholders of the latter firm in a recent special meeting. Northland is a subsidiary of the Greyhound Corp.

The corporation now owns about 99 per cent of Northland's common stock, and the merger would help simplify the corporate structure of Greyhound. The merger would give it (Greyhound Corp.) 100 per cent of Northland's earnings.

The merger, which is now before the Interstate Commerce Commission for approval, calls for the exchange of one share of the corporation's 4¼ per cent cumulative preferred stock for each share of 3¾ per cent cumulative preferred stock of Northland. Greyhound would also exchange one and a half shares of its common stock for each share of Northland. Fractional shares would be taken care of by a cash adjustment.

Flxiliner Tours the East

Bus operators throughout Pennsylvania, New York, New Jersey and New England have been examining this new "Flxiliner Champion" for the past several weeks. Joe Gettrust and Jim Dudte of Flxible, above, started in the Northeast on an extended demonstrational tour . . . are shown just prior to departure from the plant.

AN EDITORIAL

Symbols of Integrity For the Past 50 Years

• Through the course of years, our readers perhaps have noticed the two symbols which are displayed in the "masthead" of this publication. These designate our membership in two associations—are, in fact, "symbols of integrity." Their meaning to you, the reader, is both real and important.

The "ABC" symbol, for example, tells you that we are members of the Audit Bureau of Circulations; and, thus, that our subscription lists are audited and verified semi-annually by unbiased and competent auditors. In addition to guaranteeing to our advertisers a verified, completely honest circulation—this symbol also proclaims that all of our subscribers are treated alike. And treated fairly. Circulation sales methods are rigidly controlled and must meet the highest standards.

What ABP Means

The "ABP" symbol signifies membership in our industry's trade association—the Associated Business Publications; a membership, incidentally, which is partially predicated upon our adherence to the circulation methods and ethics evidenced by our ABC membership.

Golden Anniversary

The Associated Business Publications, celebrating its Golden Anniversary in 1956, has worked for fifty years to bring about the evolution of business papers from their humble beginnings to the powerful force they are today.

As one of the 162 publications belonging to ABP, we pledge ourselves to adhere to a Code of Ethics and Standards of Practice which means, among many other important things, that we are working constantly to improve our services to our readers.

The Reader's Interest

It is highly significant that the very first principle set forth in the Code of Ethics—adopted, incidentally, back in 1913—is "*To consider, first, the interests of the subscriber.*" While everything contained in the Code and Standards of Practice is important to good publishing—and therefore publishing integrity—this initial principle is the one which gives the ABP symbol its real meaning to you, the reader.

As the Associated Business Publications celebrates its Golden Anniversary, then, we take this opportunity and this space to repledge our support of the high publishing principles for which it stands and to reassure each and every one of our readers that we will ever "*consider, first, the interests of the subscriber.*"

ABOUT PEOPLE . . .

M. E. Hylton, president and general manager of Union Trailways has been named president and general manager of Trailways of New England which recently was purchased by National Trailways Bus System.

Hubert L. Glisan has been appointed traffic manager of Continental Trailways Bus System. Formerly regional manager in charge of sales and operation in south Texas, he has been with the firm 15 years.

Floyd K. Roberts has been named as sales manager for Continental Trailways Bus System. He was sales manager for Denver-Colorado Springs-Pueblo Trailways since 1956. His office will be in Denver.

William B. Knowles, manager of bus operations for the United Transit Company, (R.I.) has been elected president of the New England Transit Club for 1956-57. He has been a member of the club since 1942.

Ray Schofield has been appointed as western division sales manager of Blue Bird Body Company. He will be responsible for the sales of bodies and coaches in the western states, with offices in Georgia.

George W. Stout has merged his advertising agency with the Applegate Advertising Agency, Inc. The Applegate name will be retained with Stout becoming a vice president and administrative director.

S. T. Williams has been elected a director of Scovill Manufacturing Co. He is president and general manager of A. Schrader's Sons, a division of Scovill, and is also a vice-president of Scovill.

Randall W. Johnson has been named assistant manager of the transportation sales department of The Trane Company. He will be in charge of sales work in the company's eastern sales offices.

Wade N. Harris, executive vice-president of the Midland Steel Products Company has been elected president. Prior to coming with the firm in 1954, he was vice-president of the Murray Corp. of America.

Howard S. Cullman, honorary chairman of the board of commissioners, Port of New York Authority has been presented with the Harry E. Salzberg medal for his distinguished contributions in the field of transportation.

Lyman A. Wine, a vice-president of the Electric Auto-Lite Company has been elected to the board of directors.

Roy D. Iler has been appointed assistant sales manager of the Atlantic Greyhound Lines.

Frank L. Kibling, retired vice-president and general manager of the Springfield Street Railway Company, died recently.

Kenneth R. Brown has been re-elected chairman of the board of Des Moines Transit Company.

G. F. Bess, terminal manager for the Des Moines Transportation Company has been elected president of the Common Motor Carriers Club of Des Moines.

G. L. Wilson, noted transportation expert, died recently.

John M. Timken has been named to the board of directors of the Timken Roller Bearing Company.

H. H. Timken, Jr., has been re-elected as chairman and executive vice-president, and **William E. Unstattd** as president.

Vern C. Vanderbilt, Jr., has joined the Perfect Circle Corporation as chief research engineer.

William F. Connolly, a regional manager for the Electric Auto-Lite Company has been appointed to head replacement sales activities in the eastern region.

Other appointments: **James W. Fairbanks,** western region and **Russell W. Higgins,** southern region of the company.

R. E. Shalander has been appointed as general transportation manager for Overland Greyhound Lines with headquarters in Omaha.

W. H. Perry has been appointed district sales manager.

Sidney E. Miller, vice-president-engineering American Bosch division, American Bosch Arma Corp. was named vice-president and general manager of the Springfield Massachusetts division.

Harold R. Sennstrom, vice-president-product development will succeed Miller as vice-president-engineering.

Stanley T. Siegel has been named as traffic engineer for the city of Indianapolis, Ind. He formerly was with the National Safety Council.

Harley M. Thomas, former Akron district sales manager of trade sales for Firestone Tire and Rubber Company has been named manager of the Pittsburgh district, succeeding **E. Wayne Farnsworth.**

Ross Hershey, formerly sales engineer in the Detroit office of Timken Roller Bearing Company has been promoted to district sales manager at Buffalo, N. Y.

Other appointments: **James Freesegas,** general production manager of all plants; **Charles L. Richey,** assistant general production manager and **Wyn McCoy,** sales promotion manager of the industrial division.

Max R. Brockman, formerly assistant vice president in charge of the mechanical department of the Southern Railway will now represent the Ross and White Company on south eastern railways.

Stan H. Haigh will represent the company on the railways in the St. Paul and Minneapolis district.

BUS AND TROLLEY BUS DELIVERIES

Motor Bus Deliveries	Number of Buses	Manufacturers	Model and Type	Seat
American Buslines, Inc. (Neb.)	2	Flxible	228JT1-56-37IC	37
Atlanta Transit System, Inc. (Ga.)	12	GMC	TDH-4512	45
Atlantic Greyhound Corp. (W. Va.)	7	GMC	PD-4501	45
Bigi Bus Lines (Pa.)	1	Fitzjohn	Cityliner	39
Birmingham Transit Co. (Ala.)	8	Southern	S-45-DHC	45
Blue Motor Coach Lines (Ky.)	2	GMC	TDH-4512	45
Boise-Winnemucca Stages, Inc. (Ida.)	2	GMC	PD-4104	41
Boston, Worcester & N.Y. Street Ry. Co. (Mass.)	2	GMC	TDH-4512	45
Bushey Bus Service (Pa.)	1	Flxible	218B1-56-33IC	33
Carolina Coach Co. (N.C.)	13	GMC	PD-4104	41
Chicago, South Shore & South Bend R. R. Co. (Ind.)	1	Flxible	218GM7-56-37SU	37
Cincinnati, Covington & Newport R. R. Co. (Ky.)	2	Flxible	218F1-56-29IC	29
Cleveland Transit System (Ohio)	15	GMC	TDH-4512	15
Dept. of Street Railways, City of Detroit (Mich.)	1	GMC	TDH-5105	51
Eastern Greyhound Lines Div. (Ohio)	12	GMC	PD-4501	45
Eagle Bus Lines, Inc. (S. Car.)	1	Beck	Semi Deck and Half	41
Euclid, City of (Ohio)	6	GMC	TDH-4512	45
Fletcher, P. W. (Mo.)	1	Flxible	228JT1-55-37IC	37
Florida Greyhound Lines Div. (Fla.)	6	GMC	PD-4501	45
Fort Worth Transit Co. (Tex.)	3	Southern	S-41-HF	41
Great Lakes Greyhound Lines (Mich.)	6	GMC	PD-4501	45
Hudson Transit Lines, Inc. (N.J.)	3	GMC	PD-4104	41
Houston Transit Co. (Tex.)	30	GMC	TDH-5105	51
Jack Rabbit Lines, Inc. (S.D.)	1	Flxible	218GM1-56-29IC	29
Lansing Suburban Lines, Inc. (Mich.)	2	GMC	TDH-4512	45
Lincoln Transit Co., Inc. (N.J.)	5	GMC	PD-4104	41
Louisiana Transit Co., Inc. (La.)	2	GMC	TDH-4512	45
Missouri, Kansas & Oklahoma Coach Lines (Okla.)	6	GMC	PD-4104	41
Nashville Transit Co. (Tenn.)	2	GMC	TDH-4512	45
Overland Greyhound Lines Div. (Neb.)	4	GMC	PD-4501	45
Petersons' Garage & Auto Co. (Tex.)	1	Beck	Semi Deck and Half	41
Public Service Coordinated Transport (N.J.)	25	GMC	PD-4104	41
Public Service Coordinated Transport (N.J.)	125	GMC	TDH-4512	45
Queen City Coach Co. (N.C.)	2	Beck	Semi Deck and Half	41
Safeway Trails, Inc. (D.C.)	9	GMC	PD-4104	41
Santa Monica, City of (Calif.)	5	GMC	TDH-4512	45
Southeastern Greyhound Lines Div. (Ky.)	7	GMC	PD-4501	45
Surface Transportation Corp. (N.Y.)	1	Flxible	FT35D-44	44
United Motor Coach Co. (Ill.)	3	GMC	TDH-4512	45
Zephyr Lines Inc. (Minn.)	1	GMC	PD-4104	41
Miscellaneous Deliveries				
Carey Transportation (N.Y.)	4	GMC	PD-4104	41
Minnesota Farmers Union (Minn.)	1	Flxible	218GM1-56-29IC	29
Foreign Deliveries				
General Motors Corp. Foreign Dist. Div. (N.Y.)	4	GMC	TDH-4512	45
General Motors Corp. Overseas Opera. Div. (N.Y.)	1	GMC	TDH-4512	45
General Motors Products of Canada, Ltd. (Canada)	6	GMC	PD-4104	41

Total deliveries reported in this issue..354

Note: This list is based on monthly reports from manufacturers. Not all manufacturers report regularly, consequently this list is not to be considered complete.

"One Lipe DP Clutch went 112,000 miles without teardown . . . two more are past 125,000 and still going strong."

— says **CHRIS CASCIA, Maintenance Superintendent**
Boss Linco Truck Lines, Buffalo, N. Y.

"In September, 1953, Boss Linco Lines received delivery of three White Tractors equipped with Lipe 14" Direct Pressure Clutches. We assigned them company numbers 467, 468 and 469.

"The Lipe clutch in #468 was removed after 112,000 miles because the driven disc had become covered with grease, through no fault of the clutch itself.

"You can be sure we're well satisfied with the mileage we received from this clutch. Except for the grease, it would no doubt still be on the road along with the Lipe clutches in Tractors #467 and #469, which have now gone over 125,000 miles with no down-time for clutch service.

"As you can see, this will make a very happy difference in the maintenance record of all three vehicles."

If you want clutch mileage figures like those above in your vehicles, ask your original equipment sources to install the Lipe DP Clutch . . . now available in five sizes for engines developing from 300 to 1300 ft-lb of torque. Write for complete details.

Manufacturers of Automotive Clutches & Machine Tools

LIPE ROLLWAY

Lipe-ROLLWAY
CORPORATION
SYRACUSE 1, N. Y.

50 more MACKS for a 5-year total

On order for the Montreal Transit Commission are 50 Mack Thermodyne® Diesel 49-passenger transit buses. This brings the total number of Macks ordered by Montreal in the last five years to 180.

These new Macks—the largest capacity buses bought so far by Montreal—are specially designed to handle heavy traffic loads in the congested downtown area. Bus width is 102 inches, with single seats on one side, double seats on the other, to provide wider aisle space for easier passenger interchange and more standing room. This purchase is part of the Montreal Transit Commission's over-all plan to replace the city's trolley system.

The big-city swing to bigger buses explains why more and more big-bus orders are going to Mack. For Mack stands alone in its reputation for building the strongest, most dependable heavy-duty vehicles. And the amazing Mack Thermodyne Diesel engine is constantly setting new and greater standards for unmatched fuel economy and long life.

When you are planning your next bus order, remember—the important jobs are the ***Mack-sized*** jobs! Mack Buses, Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

MACK

first name for

BUSES

for MONTREAL

of 180

Easy Effortless Shifting...

WITH THE NEW Spicer

AIR ASSIST SHIFT

An exclusive feature of the Spicer Synchronized Transmission

Advantages of Air-Assist Control with Spicer Synchronized Transmission

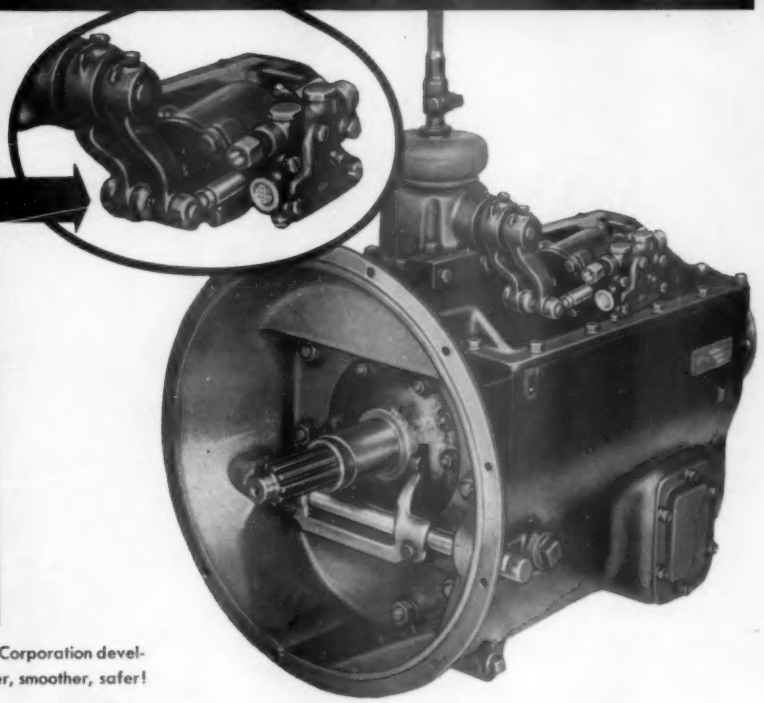
1. No change in shifting pattern. Operator goes through motions—air does the work . . . quickly, easily, quietly.

2. In case of air loss, transmission can be shifted manually, going through the regular gear shift pattern.

3. Permits more latitude in design of shift lever to avoid cab interference. The long lever required for proper hand leverage to shift synchronized transmission not required when Air Assist is used.

4. Easily adaptable to any Spicer Synchronized Transmission, as substitution of shift tower only is required. Air Assist cylinder can be assembled at either side of shift lever and air hose connection available at both ends of air cylinder.

5. Only one outside air hose required.



The new Spicer AIR-ASSIST Shift is another Dana Corporation development to make truck and bus operation easier, smoother, safer!

The AIR-ASSIST Shift is available only on Spicer Synchronized Transmissions . . . optional on new equipment, or available as a replacement unit on Spicer Synchronized Transmissions now in use.

The AIR-ASSIST Shift adds another feature to the long list of advantages already offered by the Spicer Synchronized Transmission:

- **Equal Shifts for Driver Convenience**
- **Positive Blocker Type Synchronizers**
- **More Leverage for Ease in Shifting**
- **Alloy Steel Carburized Gears**
- **TOCCO Fork Pads for Long Wear**
- **Gear Hopping Guards**
- **Large Bearings for Long Mileage**

Over 250,000 Spicer Synchronized Transmissions have been installed in heavy-duty trucks and busses, for a wide range of civilian and military services. Ask Spicer engineers to help you adapt the Spicer Synchronized Transmission and the new AIR-ASSIST Shift to your needs.

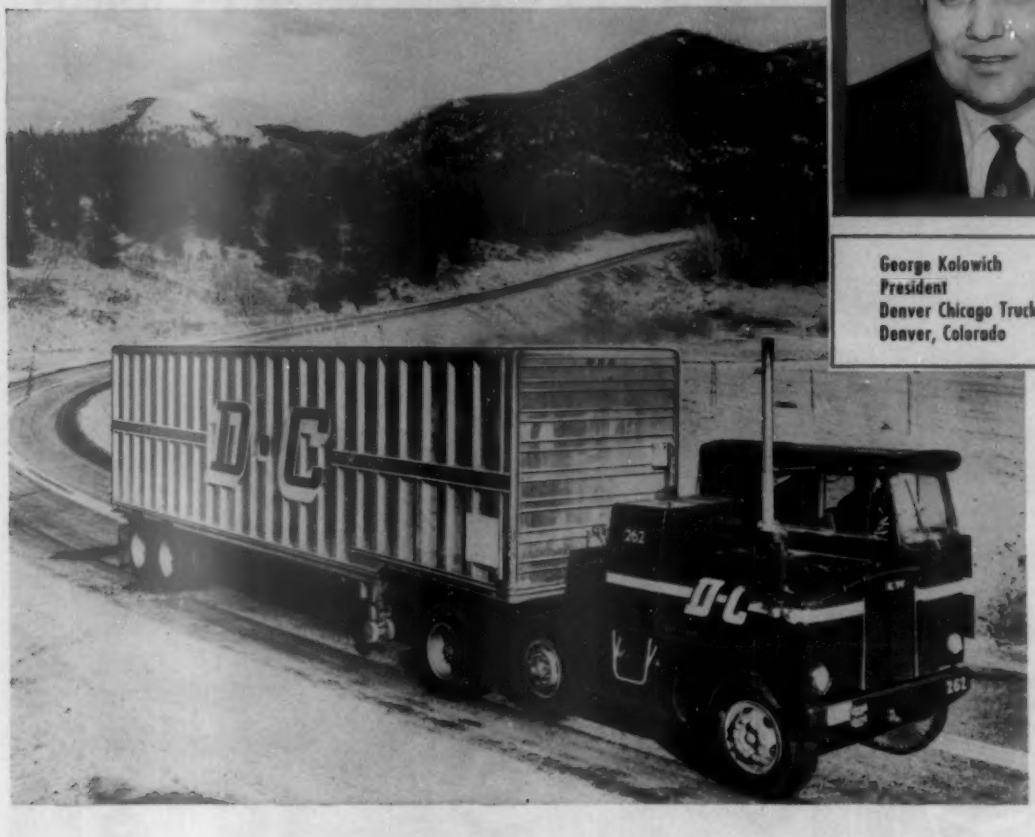
Spicer

DANA CORPORATION Toledo 1, Ohio

SPICER PRODUCTS: TRANSMISSIONS • UNIVERSAL JOINTS • PROPELLER SHAFTS • AXLES • TORQUE CONVERTERS • GEAR BOXES • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES • STAMPINGS • SPICER AND AUBURN CLUTCHES • PARISH FRAMES

"DC Has Complete Confidence in PHILLIPS 66 HDS MOTOR OIL"

George Kolowich
President
Denver Chicago Trucking Co., Inc.
Denver, Colorado



George Kolowich became president of DC in 1953. DC has steadily increased its business since he took over. Another sign of success is the new $1,000,000 terminal near completion in North East Denver.

DC, the only coast-to-coast carrier, operates some 3½ million miles a month hauling general commodities. In their truck line-up, you'll find Kenworths, Macks, Whites and Internationals. Many of these tractors use Phillips *66* Diesel Fuel and are protected by Phillips *66* HDS Motor Oil.

George Kolowich says this about Phillips *66* Products and service: "This will give you an idea of how we feel about your products. In January '55 we put a million dollars worth of new equipment into service on the Chicago-Denver segment of our coast-to-coast sleeper cab operation. We're using Phillips *66* HDS Motor Oil in this equipment exclusively. As you can see, we have complete confidence in Phillips *66* HDS Motor Oil."

Take a tip from DC. Find out what Phillips *66* has to offer. No matter what kind of fleet you operate, you'll find there's a Phillips *66* heavy duty motor oil to suit your needs. Write for information.

A Phillips 66 Lubrication Engineer will be glad to help you select the correct Phillips 66 heavy duty motor oil for your particular service conditions. Write to: Sales Department, Phillips Petroleum Company, Bartlesville, Oklahoma.

It's Performance That Counts!

Phillips 66

PHILLIPS 66 HEAVY DUTY MOTOR OILS

Durable uniforms of "DACRON" and wool are lightweight . . . give you extra miles of neatness

Long hours behind the wheel needn't spoil the neat, crisp appearance you want drivers to maintain. With lightweight uniforms of "Dacron"* blended with wool, they'll keep looking neat all day long . . . with trousers neatly pressed and jackets with practically no wrinkles—even in the rain! "Dacron" polyester fiber helps these uniforms give extra-long wear, too, through months of rugged service!

Savings start from the day uniforms of "Dacron" and wool join your busline. Maintenance is easy and economical, since fewer pressings are required and many spots can be easily removed at home. Durable and comfortable, these uniforms earn their way by cutting replacement costs!

Get all the practical features you need in uniforms by asking your supplier for tropical weight uniforms of "Dacron" blended with wool. They have the appearance and performance every driver wants!

DACRON

REG. U.S. PAT. OFF.

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Textile Fibers Department
Wilmington 98, Delaware

*"Dacron" is Du Pont's registered trademark for its polyester fiber.

"223,000 miles—no overhaul necessary thanks to Cities Service C-300 Motor Oil!"

North Branch Bus No. 181, a gasolene unit, has traveled 223,000 miles since the firm switched to Cities Service C-300 Motor Oil. And that 223,000 miles isn't over level terrain—not by a long shot. It's up and down the rolling hills surrounding Bloomsburg, Pa. Yet, despite this mileage and driving conditions, Bus No. 181 shows absolutely no need of overhaul and is expected to travel thousands of miles further, thanks to Cities Service C-300 Motor Oil.

Says General Manager Fred M. Endt: "That's typical of the results we've gotten with our entire fleet since we started using Cities Service products. For example, using Trojan MP 140 Gear Oil, mileage on one unit's differential has passed 243,000 miles with no overhaul needed, and what's more no overhaul is expected for some time to come.

"Service has also been excellent. Cities Service representatives, using their ingenious Power Prover, have spent many hours helping us solve our problems . . . and the help they've given has substantially reduced maintenance costs for our entire fleet."

North Branch Bus Company is one of scores of fleet operators—large and small—who report outstanding results with Cities Service products. To find out the reasons, talk with a Cities Service Representative. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

GET THE BENEFITS OF

WITH AC

"BALANCE"

COMMERCIAL SPARK PLUGS!

Today's higher-compression, faster-firing engines operate best with the *balanced heat* design of AC Commercial Spark Plugs! *Balanced heat* ensures the proper heat range for a particular fleet application . . . highway transport or city delivery, mountain grades or level plains.

Two exclusive AC features—*Conductaseal* and *Hot Tip*—hold heat in the firing end of the plug, where it's most useful. That's *balanced heat* that gives better performance.

In addition, these two exclusive AC features give longer life and higher efficiency! *Conductaseal,* the unique seal of fused metal and ceramics, provides high conductivity for full-bodied sparks and compression-tight sealing. *Hot Tip,* the deeply recessed insulator tip, heats up fast to prevent fouling that causes misfiring, and cools fast, too, to eliminate harmful pre-ignition.

Standardize on AC Commercial Spark Plugs—as so many cost-conscious fleet operators are doing—discover the big difference *balanced heat* can make in the operation of your trucks!

AC SPARK PLUG THE ELECTRONICS DIVISION OF GENERAL MOTORS

Frank McOsker, veteran driver for the Department of Street Railways, Detroit, Michigan

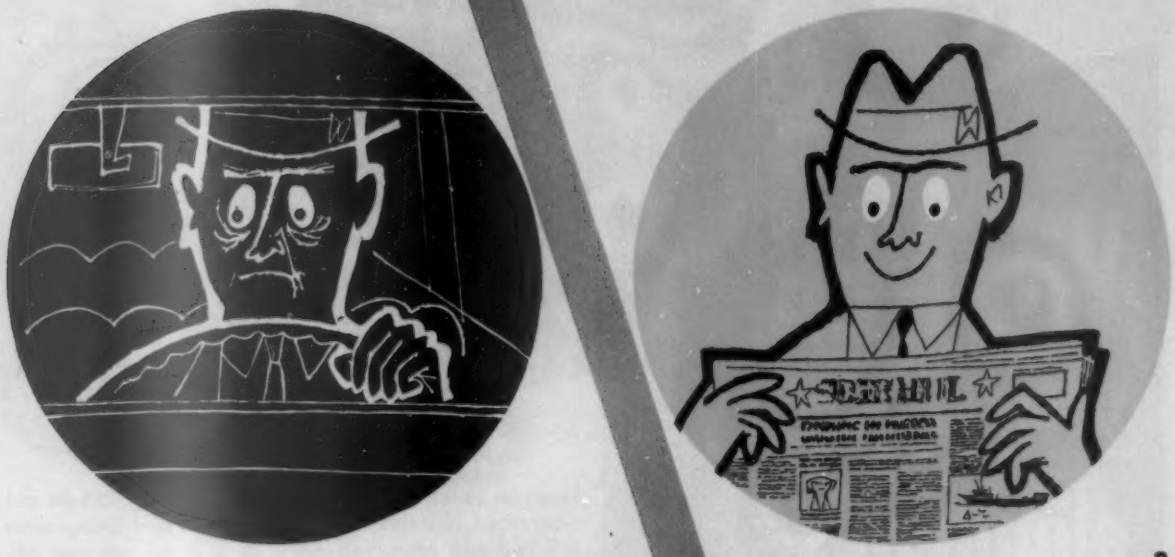
21 years of accident-free driving because he's always been able to stop

Frank McOsker has been driving buses for the past twenty-one years. This fact in itself does not make Frank's case particularly newsworthy . . . but Frank's driving record does. For Frank McOsker has driven only Bendix-Westinghouse Air Brake equipped buses—and he has never had an accident. While it may be impossible for you, the bus-line operator, to have a Frank McOsker at the wheel of each of your buses, you *can* do the next best thing by continuing to equip your fleet with Bendix-Westinghouse Air Brake Equipment. No braking system in the world has a greater safety record to substantiate its reputation for dependability.

ASK FOR AND INSIST ON

Bendix-Westinghouse **AIR BRAKES**

BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY • General offices and factory—Elyria, Ohio • Branches—Berkeley, California and Oklahoma City, Oklahoma



Why should he hold a steering wheel when he can hold a newspaper?

LUMINATOR fluorescent bus lighting lets him read in easy-chair comfort

This is your big advantage over the automobile. So make the most of it.

He can't read while he's driving. But he can read in comfort on buses with Luminator fluorescent lighting. Plenty of bright reading light in the right places—but always glareless, shadowless, easy on the eyes. Luminator lensed fixtures control the light—focus it on the reading level. Passengers are never dazzled by the lights for other seats. Yet there's enough general lighting to avoid harsh, eye-straining lighting contrasts.

Always specify Luminator for engineered, controlled lighting that assures rider preference, greater revenues.

Drop in and see full-scale mock-ups of the latest developments in transportation lighting at Luminator's Lighting Laboratory.

LIGHTING ENGINEERS • DESIGNERS • MANUFACTURERS

LUMINATOR inc.

120 NORTH PEORIA ST., CHICAGO 80, ILLINOIS

IN CANADA: RAILWAY AND POWER ENGINEERING CORP

Easy does it-
THE WEAVER WAY

Model WR-31

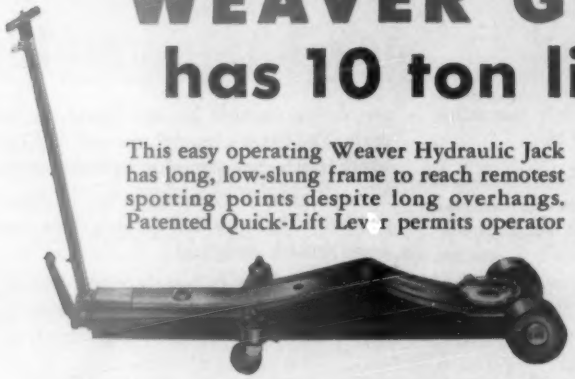
WEAVER WHEEL DOLLY eliminates wheel handling problems

Don't let tough wheel handling jobs tie up your men and slow down bus servicing. A Weaver Wheel Dolly turns this two-man operation into a quick, easy, one-man job.

Lifting arms of Dolly remove jacked-up wheel from spindle, or pick wheel off floor and replace on spindle. Built-in hydraulic jack powers all lifting and lowering. Strong chain and crossbar hold wheel upright. Roller type arms permit revolving wheel to line up bolts or keyways. Ball bearing swivel casters permit easy movement of loaded Dolly.

The Model WR-31 Truck and Bus Wheel Dolly shown has a load capacity of 2500 lbs. and handles all tire diameters. See and inspect this and other models at your Weaver Jobber today or write us for Bulletin BT-602.

WEAVER GIANT JACK has 10 ton lifting capacity



This easy operating Weaver Hydraulic Jack has long, low-slung frame to reach remotest spotting points despite long overhangs. Patented Quick-Lift Lever permits operator to see spotting point as he raises saddle. Handle operates on any phase of stroke . . . stays in vertical position when not in use. Easily maneuverable. Safety protected against accidental lowering, overloading, slipping, or tipping. Lifting range 5⅞" to 24". See it at your Weaver Jobber or write us for Bulletin BT-461.

WEAVER MANUFACTURING CO., SPRINGFIELD, ILL., U.S.A.

WEAVER SERVICE SHOP EQUIPMENT

Complete Weaver line includes: Twin Post Lifts . . . Single Post Frame Type Lifts . . . Unit Lifts . . . Bumper Lift . . . Car Washers . . . Wheel Alignment Equipment . . . Headlight Testers . . . Brake Testers . . . Wheel Balancing Equipment . . . Jacks . . . Wheel Dollys . . . Air Compressors.

500 More SCENICRUISERS for Greyhound

. . . . . making 1,000 with VICKERS®

HYDRAULIC POWER STEERING

Performance of Vickers Hydraulic Power Steering on 700 Greyhound Highway Traveler Coaches brought about its use on the first 500 Greyhound Scenicruisers. Experience with these Ultra-Modern Coaches induced Greyhound to order 500 more . . . making 1,000 Scenicruisers with Vickers Hydraulic Power Steering.

Greyhound uses Vickers Hydraulic Power Steering because of its contribution to MAXIMUM SAFETY and smoothness of operation . . . and because it combines dependability with long trouble-free life. "Finger-touch" control eases the driver's job . . . keeping him fresh, alert, efficient, safe. Front wheel shock from obstructions is automatically absorbed by the power mechanism . . . there can be no kick-back at the steering wheel. The advantages of extra steering power and quick maneuverability have been proved under emergency conditions . . . on city streets as well as the open highway.

Vickers Hydraulic Power Steering is easily applicable to new and existing vehicle designs . . . usually with very minor alteration. Get additional information by asking for Bulletin M-5106.

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DIVISION OF SPERRY RAND CORPORATION
ADMINISTRATIVE and ENGINEERING CENTER
DEPARTMENT 1408 • DETROIT 32, MICH.

Application Engineering Offices: ATLANTA • CHICAGO • CINCINNATI • CLEVELAND DETROIT • HOUSTON • LOS ANGELES AREA (El Segundo) • MINNEAPOLIS • NEW YORK AREA (Summit, N.J.) • PHILADELPHIA AREA (Media) • PITTSBURGH AREA (Mt. Lebanon) • PORTLAND, ORE. • ROCHESTER • ROCKFORD • SAN FRANCISCO AREA (Berkeley) • SEATTLE • ST. LOUIS • TULSA • WASHINGTON • WORCESTER
IN CANADA: Vickers-Sperry of Canada, Ltd., Toronto

VICKERS®
Hydraulic Power Has Been Steering Motor Vehicles For More Than 25 YEARS

Vickers Hydraulic Power Steering Booster does the actual work of steering. It can be furnished to provide any desired steering wheel rim pull.

Engine-driven Vickers Balanced Vane Type Pump supplies the power for steering. This extremely compact pump has integral volume control and relief valves, and oil reservoir.

7374

Engineers and Builders of Oil Hydraulic Equipment Since 1921

With SHELL ADC* Oilprint Analysis . . .

Part of the fleet operated by Cleveland-Lorain Highway Coach Co., Lorain, Ohio, lubricated by Shell Rotella Oil and protected by Shell ADC* Oilprint Analysis.

"Extended oil drain intervals... lower repair costs"

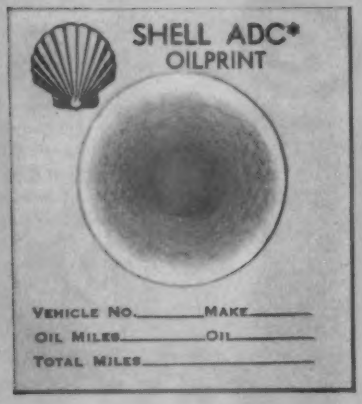
HERE'S ANOTHER transportation company that has found the Shell ADC* Oilprint Analysis a cost-saving tool of preventive maintenance. By its use, oil drain intervals have been extended safely on some new diesel coaches.

Furthermore this fast, reliable oil check has revealed many potential troubles in advance, such as oil contamination due to block fracture . . . in time to save costly repair bills. The Cleveland-Lorain Highway Coach Co. is enthusiastic about it.

The Shell ADC Oilprint Analysis enables fleet operators to test crankcase oil in the short time allotted for re-fueling and crankcase oil checks . . . mere *minutes*. It eliminates draining still-good oil and the risk of using oils loaded with contaminants.

Let us demonstrate how we can put this new cost-saving PM tool to work for you.

*Trademark



One Drop tells the Story!

The operator places just one drop of oil on the card. Analysis gives conclusive check of oil's condition.

SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL

BECK'S

41 PASSENGER "Semi" DECK AND HALF WITH

AIR SUSPENSION RIDE

THESE OPERATORS KNOW

QUEEN CITY TRAILWAYS, N. Car.
ANDERSON CHARTER SERVICE, Pa.
EAGLE BUS LINES, S. Car.
KERRVILLE BUS CO., Tex.
TRANSPORTE DEL NORTE, Mex.

- CUMMINS TURBODIESEL POWER
- "AIR-GLIDE" AIR SUSPENSION
- TROPIC AIRE CARRIER – AIR CONDITIONING
- EDWARDS "KICKOUT" SASH
- WRAP AROUND VISION – FRONT AND REAR
- NATIONAL "DELUXE" SEATS

• Queen City Trailways placed their first BECK Semi's in operation last December and January. After checking public acceptance and performance they immediately placed a "repeat" order for April delivery.

By the time the April deliveries were completed, the public acclaim for this exceptional bus warranted their placing a second "repeat" order for May and June delivery.

Remember--

Air Suspension is a "must" for long haul service – the traveling public knows the difference.

C. D. BECK & COMPANY, INC., SIDNEY, OHIO, U.S.A.

FREEDOM OF DESIGN

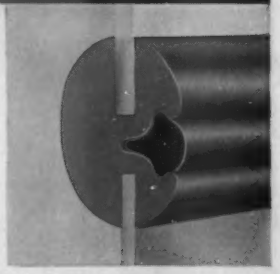
with Inland Self-Sealing Weather Strip

Inland Self-Sealing Weather Strip, with the separate filler strip, simplifies the design job, permits freedom for creative designing. No provision need be made for moldings, channels, binder strips or cement when designing with Inland Weather Strip.

You'll find that wherever Inland Weather Strip goes in, water stays out . . . in cars, buses, trucks, planes, trains, other over-the-road vehicles . . . in large and small boats that fight heavy seas . . . in factories, stores, theaters, hotels, homes, hospitals and many other structures. In fact, you'll find it wherever fixed windows of any size or shape must be positively sealed!

The patented Inland Filler Strip does it . . feeds easily into the locking channel . . . sets up positive, permanent pressure on **both** fence and glass! Installation, or glass replacement, is fast work for **only one man**, and done **on the job**.

INLAND
self-sealing weather strip
(PATENTED)



INLAND MANUFACTURING DIVISION
General Motors Corporation, Dayton, Ohio

a part of the General Motors Master Plan for Greater Highway Safety through Better Engineered Products!

Whatever the **DESIGN**...
We can make it **WATER-TIGHT!**

Transportation Industry

Automotive Installations

Railway Equipment

Marine Applications

Over-the-road Equipment

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SASH FOR EVERY TYPE OF TRANSPORTATION—ON LAND, ON THE SEAS, IN THE AIR

SEARCH FOR PERFECTION . . . GM engineering research and development are continually under way to produce better coaches for the transportation systems of America. All materials and component parts used are subjected to extensive, exhaustive tests to determine which will contribute to longer coach life, lower maintenance costs and greater passenger comfort. **Edwards Sash — the eyes of transportation — has been standard window equipment on GM Coaches for many years.**

EDWARDS SASH

All over America — wherever and whenever the wheels of transportation turn — you'll find the finest, most modern coaches Edwards Sash-equipped. Leading manufacturers standardize on it — profit-minded operators specify it.

Regardless of the type of bus or service — there's an Edwards Sash that meets exactly — and economically — every operating and service requirement. Write today for complete information.

- MAXIMUM VISIBILITY
- MINIMUM MAINTENANCE
- RATTLE-FREE, WEATHER-TIGHT FIT
- FINGER-TIP OPENING AND CLOSING
- STREAMLINED CONSTRUCTION

THE O. M. EDWARDS CO., INC., SYRACUSE 3, N.Y.
New York Office—50 Church St., N.Y. 7, N.Y.
***In Canada:* O. M. EDWARDS CO. OF CANADA LIMITED**
Offices and Plant
335 Laurentian Boulevard,
St. Laurent, Montreal 9, P.Q.

Savings increase...

More properties report reduced fuel and maintenance costs with

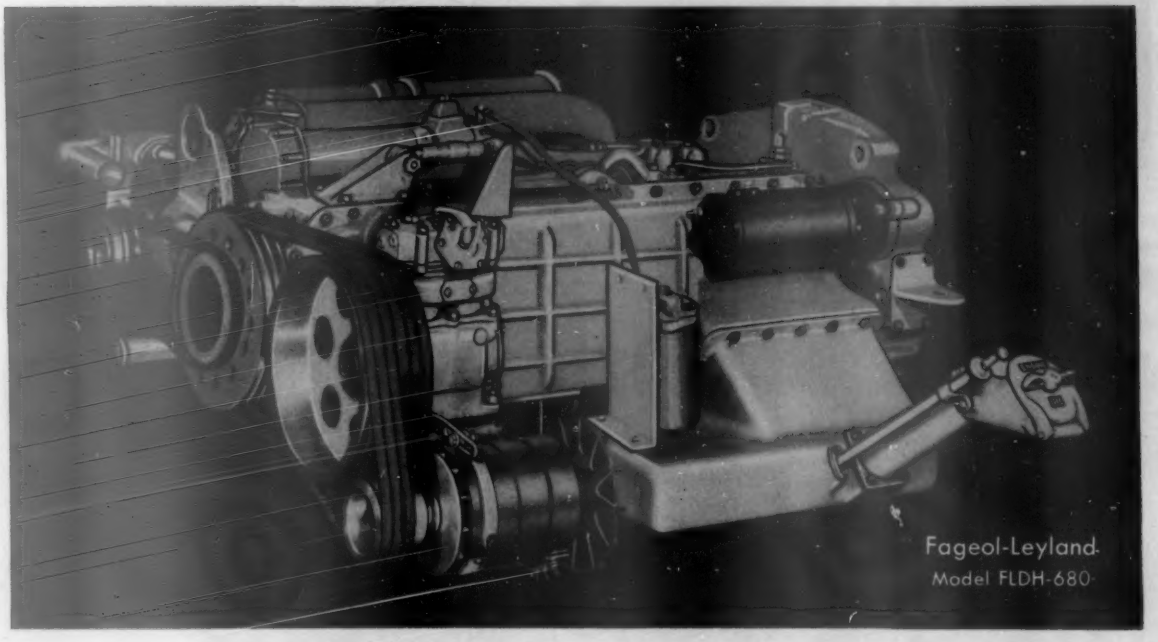
Fageol-Leyland diesels!

Amazing figures . . . and enthusiastic comments . . . are coming in from properties which have converted their gasoline-powered ACF-Brill and White buses to new Fageol-Leyland diesels.

These continue to show tremendous savings on fuel and maintenance . . . reflect reduced depreciation expense and capital investment charges.

It will pay you to investigate today and find out the facts!

Write Diesel Engine Conversion Division, Twin Coach Company. Ask how you, too, can *save up to 4 cents per mile on fuel and maintenance* . . . how you can transform your ACF's and Whites into the best performing, most economical units in your fleet.



TWIN COACH COMPANY
KENT, OHIO

AA-1603

When it comes to reducing air brake maintenance costs, here's what other bus operators say about

WAGNER ROTARY AIR COMPRESSORS

. . . "last longer . . . over 200,000 miles without any repair or failure."

E. D. CARPENTER, Maintenance Mgr.
Blue Ridge Transportation Co.
Washington, Pa.

. . . "assure greater safety and keep maintenance costs low."

E. J. MARCINSKI, Supt. of Maintenance
South Suburban Safeway Lines, Inc.
Harvey, Ill.

. . . "have long service life . . . are economical to operate."

ROLAND M. WRIGHT, Supt. of Equip.
Cincinnati Transit Company
Cincinnati, Ohio

. . . "operate over twice as long and keep air lines free of carbon and varnish."

J. F. NICHOLS, Asst. Supt. of Equip.
Louisville Transit Co.
Louisville, Ky.

These are some of the good reasons so many leading bus operators everywhere look to Wagner to fulfill their air brake needs. For Wagner Air Brakes are *complete* and offer more worthwhile maintenance economies and provide maximum safety protection—important factors for you to consider in your bus operation.

The "heart" of every Wagner Air Brake System is the Wagner Rotary Air Compressor. Its high volumetric efficiency assures an adequate supply of air pressure at all times regardless of terrain, or the frequency of stops.

The new fully automatic Wagner Moisture Ejection Valve is especially designed to keep air tanks clean and moisture free. It cannot "freeze" in open position and as a result the time delays usually encountered in building up air pressure during cold weather are minimized.

Wagner Brake Application Valves provide smooth, easy stopping control for the operator while Wagner Relay Quick-Release Valves eliminate the movement of large volumes of air through long air lines. And for straight air systems Wagner offers you a choice of nylon and neoprene diaphragm brake chambers or power cylinders.

Yes, look to Wagner for all your air brake needs—so many other safety-minded bus operators do. Send today for your free copy of Wagner Bulletin KU-201 . . . it contains full details and data on complete Wagner Air Brake Systems and precision engineered Wagner Air Brake Controls and Valves.

K56-5

Nothing beats the controlled safety protection of complete Wagner Air Brakes

WAGNER ELECTRIC CORPORATION, 6461 PLYMOUTH AVENUE • ST. LOUIS 14, MO., U.S.A.

Wagner Air Brake Systems

LOCKHEED HYDRAULIC BRAKE PARTS and FLUID • NoRoL • CoMaX BRAKE LINING • AIR BRAKES • AIR HORNS • TACHOGRAPHS • ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES

RUB-BUB

TRANSPORTATION PRODUCTS

First in Safety
. . . Last to Wear

Rub-Bub Heavy-Duty Safety Step Plate and Rub-Bub Heavy-Duty Safety Platform Plate
Rub-Bub Dekoron Stanchions, Seat and Grab Rails
Rub-Bub Safety Aisle Tread and Safety Smooth Flooring

RUB-BUB®
Transportation Products

SAMUEL MOORE & CO. MANTUA, OHIO

IN CANADA | SAMUEL MOORE & CO. OF CANADA, LTD.
Represented in Canada exclusively by
RAILWAY & POWER ENG. CORP.

AA-2773

Steel so fine we have to make it ourselves!

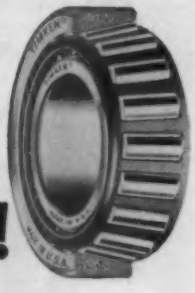
(Another reason why TIMKEN® bearings are first choice with bus manufacturers)

THE quality of Timken® tapered roller bearings is rigidly controlled every step of the way. We're so insistent on giving you quality that we even make our own steel—something done by no other American bearing manufacturer. From melt shop to finished product, Timken bearings are made to meet the *very highest standards.*

Only Timken bearings give you all these advantages: 1) special analysis Timken bearing steels; 2) advanced geometrical design, for true rolling motion; 3) precision manufacture; 4) rigidly controlled quality. That's why Timken bearings are first choice with men who know buses best—bus manufacturers.

The next time it's a question of tapered roller bearing replacement, make sure you get Timken bearings. Look for the trade-mark "TIMKEN" on every bearing. For helpful service information, get the free booklet: "Timken Tapered Roller Bearings—Their Care and Maintenance". Write to: Dept. TB-6, The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable: "TIMROSCO".

SINCE THEY'RE BEST WHEN THE BUS IS NEW, THEY'RE BEST FOR REPLACEMENT, TOO!



TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL ⬮ AND THRUST ⟷ LOADS OR ANY COMBINATION ✳

GUNITE BRAKE DRUMS
FOR TRUCKS, TRAILERS, BUSSES

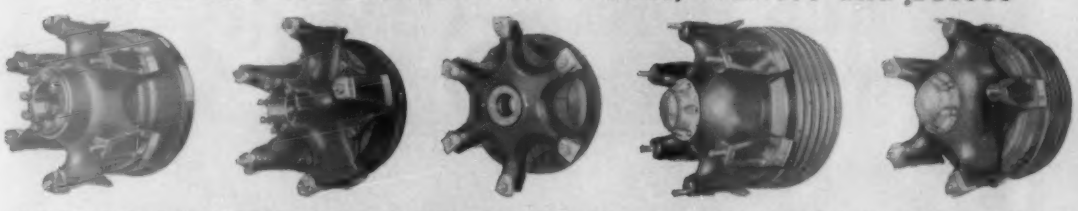
Lower Cost per Mile . . .

Less down time . . . longer drum and lining life . . . more dependable brakes and greater operating safety are yours with Gunite Brake Drums. Gunite experience, Gunite design and Gunite-Metal combine to bring you better, safer, brake operation at lower cost per mile. Specify Gunite Brake Drums on a test vehicle or fleet . . . and watch costs go down.

Call Your Gunite Distributor

Or Write and We'll Have Him See You

Gunite Cast Steel Wheels for Trucks, Trailers and Busses



GUNITE FOUNDRIES CORPORATION • ROCKFORD, ILLINOIS

Established in 1854

Avoid breakdowns with the help of Socony Mobil's simplified P. M. System... it's the talk of the industry!

Now – thanks to Socony Mobil's new Preventive Maintenance System – you can practically eliminate breakdowns due to improper lubrication maintenance!

You work with only three things – work sheet, record folder, control blackboard. We supply work sheets and record folders – show you how to set up the entire system. There's minimum paper work – no confusion. *Each unit is always under control.*

This system also includes analysis of your fleet conditions, help in setting up lubrication schedules and inspection periods, lubrication engineering service when necessary.

Use this exclusive P.M. system – and our top-quality oils and greases – to help keep your fleet rolling!

CORRECT LUBRICATION FOR FLEET OPERATORS

THE FLYING RED HORSE COMPANIES: SOCONY MOBIL OIL CO., INC., MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.

when you install ADLAKE

you say goodbye to window sash troubles!

Your passengers *want* ADLAKE windows, because they're free from drafts, leaks, and rattles. And even your elderly lady passengers can raise and lower the windows easily! You (and your comptroller) will want ADLAKE windows because they put an end to costly maintenance.

For more information about ADLAKE Aluminum Sash, write The Adams & Westlake Company, 1154 N. Michigan St., Elkhart, Indiana. No obligation, of course.

Adlake 99th year of serving the transportation, building and control industries

The Adams & Westlake Company

Established 1857 • Elkhart, Indiana • New York • Chicago

put your mind at ease... while the fleet's away!

Multi-Luber
POWER LUBRICATION SYSTEMS

***Lincoln* Multi-Luber SYSTEMS**

provide on the road

AUTOMATIC POWER LUBRICATION

Here's proper protection *while* your "pay-loads" roll! Only Lincoln Multi-Luber provides the simplest, most dependable method for positive, periodic lubrication of all bearings, *automatically*, while your equipment is operating!

One fleet owner reports Multi-Luber extends inspection time up to 150,000 miles . . . and savings up to 90% per single overhaul. But that's not all! Look how a low cost investment in Multi-Luber increases operating efficiency . . . cuts maintenance costs!

1. MULTI-LUBER eliminates man-hours and equipment down-time required for conventional chassis lubrication.
2. MULTI-LUBER increases operating efficiency of equipment to a uniform maximum.
3. MULTI-LUBER increases service-life of bearings and moving parts . . . reduces cost of replacing bearings damaged due to inadequate lubrication.
4. MULTI-LUBER reduces stocks of replacement parts.
5. MULTI-LUBER prevents waste and contamination of lubricant . . . sealed System assures application of refinery-clean lubricant each time Multi-Luber is cycled.

***writes Mr. Orval J. Lindell, *Superintendent of Maintenance*, CONSOLIDATED FORWARDING COMPANY, Inc., St. Louis, Mo.**

"Of primary importance to us is the fact that the Multi-Luber System guarantees uninterrupted lubrication when the trailer is interlined. Our minds are at ease because we know that all bearings are being properly lubricated when the trailer is away from 'Home Base'."

NOW! THREE TYPES OF Multi-Luber* SYSTEMS TO MEET ALL YOUR REQUIREMENTS

AIR-OPERATED—Designed for use wherever compressed air is available as motive power. Applications include *Trucks*, *Trailers* and *Buses* equipped with air brakes. May be actuated automatically (for example, with every brake application) or manually at the operator's discretion.

VACUUM-OPERATED—Ideal for equipment ranging from *light trucks* and *automobiles* to *fork-lift trucks*. Installation for manual or automatic operation. Where manual actuation is preferred, as on vehicles equipped with hydraulic brakes, a control panel is provided . . . with push button and signal light to indicate completion of the cycle.

MANUALLY-OPERATED—Designed for use where neither compressed air nor vacuum is available. Applications include *Farm Implements* and electrically driven *Fork-Lift Trucks*. At the push of the handle, an exact amount of lubricant is applied to each bearing.

*Registered Trade Name

LINCOLN ENGINEERING COMPANY
5701 Natural Bridge Ave., St. Louis 20, Missouri

Please send me my free copy of Bulletin 528 giving complete details on Lincoln *Automatic* Power Lubrication Systems.

Name.....

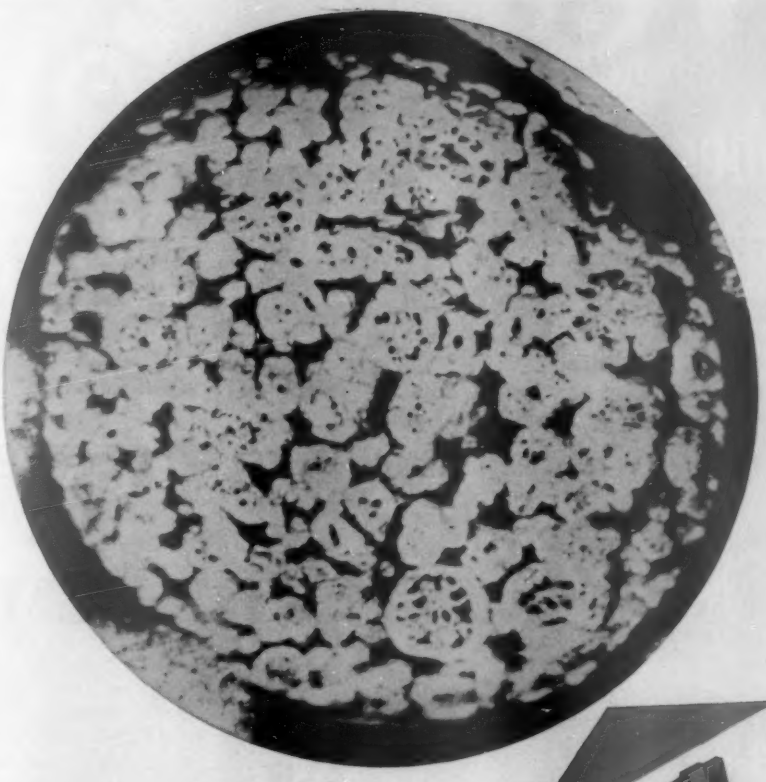
Company.....

Address.....

City.....Zone.....State.....

LINCOLN ENGINEERING COMPANY
5701 Natural Bridge Ave. • St. Louis 20, Missouri
IMAGINATION FOR AUTOMATION

OVER 300 FLEETS ALREADY USING THE LINCOLN MULTI-LUBER
NATIONAL SALES AND SERVICE THROUGH LEADING WHOLESALERS



Today's long mileage

in heavy-duty bearings

ALL STARTED HERE

Fm *Sintered Copper-leads still show the way!*

That big circle is a photo (greatly enlarged) of a particle of Fm copper-lead powder. In this particle—about the size of a speck of pepper—copper shows light, lead is dark. The important thing to see is the uniform distribution of the copper, for strength . . . and lead, for "softness". And here's the amazing part: *Each* powder particle has the same *controlled* proportions of copper and lead!

Federal-Mogul's pure powder retains its distribution pattern right on through our manufacturing steps; "sintering" on steel strip, forming and machining.

This close control of grain structure provides superior bearing properties, greater crankshaft protection and longer engine life.

To you, that means your Fm copper-lead bearings have, *and will keep*, the strength and performance vital to fleet mileage today. For heavy-duty performance, they have no equal! Ask your jobber—he provides a complete line of Fm heavy-duty bearings for replacement.

Fleet

FEDERAL-MOGUL SERVICE

Division of Federal-Mogul-Bower Bearings, Inc.

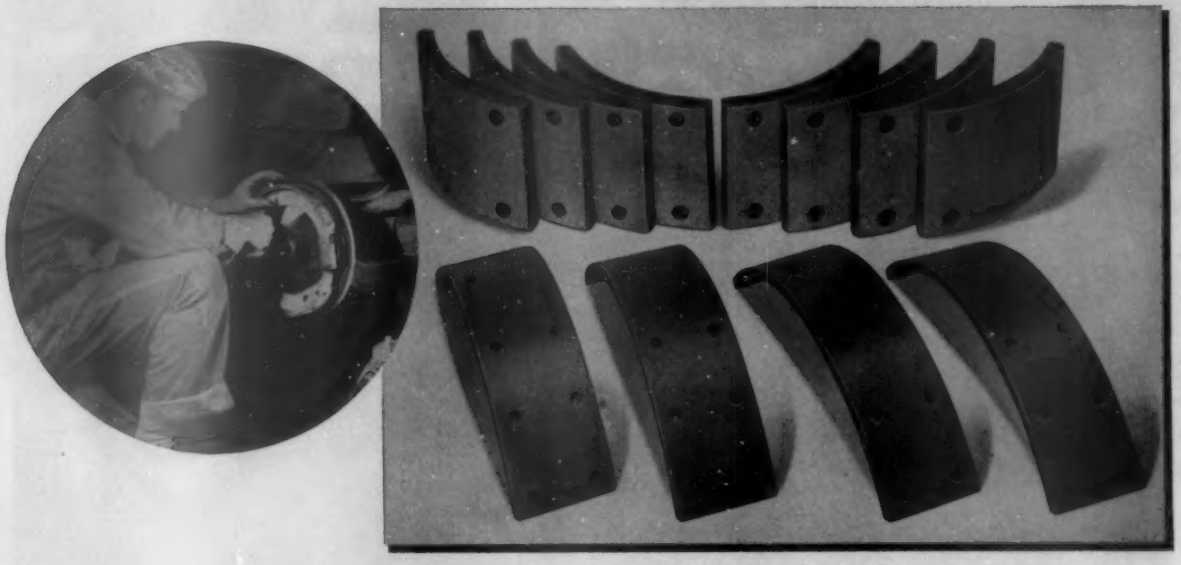
BEARING FEDERAL Mogul SERVICE

GET IT FROM YOUR JOBBER

Mileage

YOU'LL GET LOWER COSTS PER MILE...

AND NEED FEWER BRAKE ADJUSTMENTS WITH Wagner® BRAKE LINING



Available in blocks... sets... rolls... slabs... cut segments... and on shoes

Wagner Brake Lining will give your bus fleet more miles between relines with fewer brake adjustments and less drum reconditioning. That means lower maintenance cost per mile . . . less revenue-wasting "down time."

Top quality Wagner Brake Lining is uniform in density, composition, and frictional qualities throughout its entire service thickness. It withstands extremely high drum temperatures . . . will never compress, absorb moisture, or deteriorate with age. Contains no harmful abrasive materials to damage drums. Wears slowly and evenly.

Wagner Brake Lining is available in blocks, sets, rolls, slabs, cut segments, and on shoes—either "bonded-on" or "riveted-on". There are more than 100 width and thickness combinations . . . over 400 individual sets . . . and over 350 block sizes. Coverage is complete for all vehicles.

You can get Wagner Brake Lining as well as Wagner Lockheed Hydraulic Brake Parts and Fluid from ONE convenient, reliable source—your nearest Wagner Jobber. See him today!

You can depend upon Wagner Quality because Wagner Products are used as original equipment by manufacturers of cars, trucks, buses, and trailers.

Wagner Electric Corporation
6461 Plymouth Ave., St. Louis 14, Mo., U. S. A.
(Branches in principal cities in the U. S. and in Canada)

B56-8

EST. 1891 **Wagner** ...the best known name in brake service

LOCKHEED HYDRAULIC BRAKE PARTS and FLUID • CoMoX BRAKE LINING • NoRol • AIR HORNS • AIR BRAKES • TACHOGRAPHS • ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL CRANE BRIDGE BRAKES

Time was when bus travel in summertime had little to recommend it, but carriers like Greyhound's Highway Traveler are rapidly changing all that. . . . This luxury coach has six-foot panoramic windows, adjustable reclining chairs, the famous Air Suspension Ride, and most important of all, perhaps, perfected air conditioning by Tropic-Aire. . . . Its Tropic-Aire system, product of McGraw Electric Co., Chicago, operates on dependable Continental Red Seal power. . . . Gasoline Models Y-91 and Z-129, and the latter's ZD-129 Cushioned Power Diesel counterpart are interchangeable in the same compartment, with identical mountings. . . . All three have been engineered expressly for the job.

• • •

Continental Motors Corporation

MUSKEGON • MICHIGAN

CONTINENTAL MOTORS ® Powerful as the Nation AMERICA'S STANDARD

6 EAST 45TH STREET, NEW YORK 17, NEW YORK • 6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • 3817 SOUTH SANTA FE AVENUE, LOS ANGELES 58, CALIFORNIA • 1252 OAKLEIGH DRIVE, EAST POINT (ATLANTA) GEORGIA

If it's marked T[G]* it's OIL PROOF

***Look for Tg on the belt itself as well as on the label of every belt you buy for rear engine service. Tg is Gates designation for a belt *specially engineered* for rear engines.**

CUTS BELT COSTS IN HALF

The operating cost records of many leading transit companies show that Gates Coach Belt—the belt marked Tg—often lasts more than *twice* as long as other belts.

Double Service life cuts belt costs **in half.**

Without obligation a Gates Belt Specialist—available through your Gates jobber—will make cost-cutting belt recommendations. And your Gates jobber will supply you promptly with the Gates Tg belts you need.

OIL PROOF:

Oil rots ordinary rubber. Gates Tg Belt is made with special rubber compounds which are not affected by oil.

HEAT RESISTANT:

The same special compounds which make the belt oil proof also make it resistant to the intense heat of bus engines—heat produced by the heavy loads imposed on the engine by start-and-stop operation.

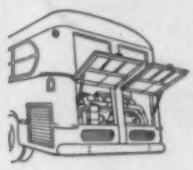
THE GATES RUBBER CO . . . DENVER, COLORADO

World's Largest Maker of V-Belts.

THE MARK OF *SPECIALIZED* RESEARCH — Gates — TPA 82

Gates Coach Belts

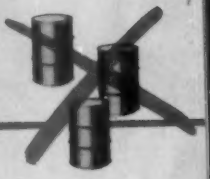
SPECIALLY ENGINEERED FOR REAR ENGINES



ONE

ONE GUN

FROM 3

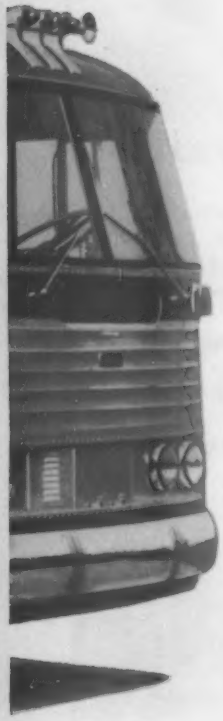


SINCLAIR LITHOLINE

GREASE

CUTS INVENTORY

TO 1



If you now use three different greases – chassis, wheel bearing and water pump – you *should* change to Sinclair LITHOLINE® Multi-Purpose Grease. Sinclair LITHOLINE eliminates the need for several different greases and separate pieces of equipment. With LITHOLINE, you use one grease, one gun – cut inventory from 3 to 1. You also eliminate the danger of misapplication and contamination.

Moreover – facts reveal that LITHOLINE lengthens lube intervals, has also lengthened the life of King Pins, Shackles and U-Joints by at least 40%. Cost-conscious fleet owners can tell you, from actual experience, that LITHOLINE saves them money.

Let a Sinclair Lubrication Engineer show you how Sinclair LITHOLINE Multi-Purpose Grease can help you get the most out of your equipment. Call your nearest Sinclair Representative now, or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y. *No obligation, of course.*

MULTI-PURPOSE GREASE

You can guess what we've got in our backyard!

. . . and in case you haven't guessed; *we've got motor coaches.* Fact is, we're up to *here* in motor coaches. Don't misunderstand—we're not complaining. We're proud.

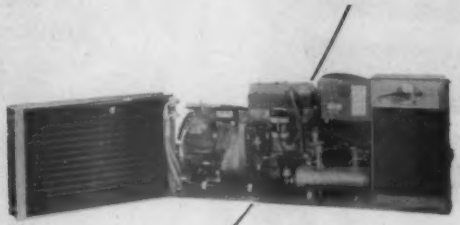
In the working area behind our plant, we install that dependable, low-cost, lightweight Tropic-Aire—Carrier motor coach air conditioning equipment. There are brand-new buses from everywhere—big fleets, little fleets, middle-size fleets—in our back yard. And there are good reasons. Performance, for instance. Tropic-Aire—Carrier air conditioners deliver billions of passenger miles of trouble-free service every year. Design means a lot, too. No matter what the make or model of bus, we nearly always can supply Tropic-Aire—Carrier equipment for the job. Economy is a third big factor . . . because first cost is far lower than you think, and operating economy is a still bigger feature.

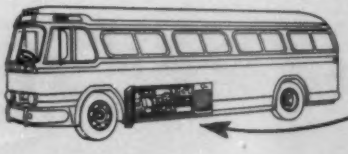
So . . . our back yard is full of motor coaches. When you decide to air condition *your* fleet—big or small—remember that you can depend on Tropic-Aire—Carrier for the best . . . in dependability, durability and economy. (Installation and service centers in both Chicago and Toledo).

Carrier
TROPIC-AIRE

TROPIC-AIRE, INC., 5201 W. 65th Street, Chicago 38, Illinois

Tropic-Aire, Inc. is a subsidiary of McGraw Electric Co.





Mr. Kenneth Hudson (left), president of the Hudson Bus Lines of Medford, Mass. talks about maintenance with William C. Bickel, Gulf assistant district manager.

"We want good lubrication— but we watch those pennies, too!"

says Kenneth Hudson, president of the Hudson Bus Lines

"We have tried a number of motor oils, but have found the best combination of quality and economy is Gulf Dieselube H.D.," says Mr. Hudson. "It keeps our maintenance costs down, yet is surprisingly low in price. We are also getting some mighty fine results with Gulflex A—a single grease that takes care of all our grease applications."

Cut costs with Gulf Dieselube H.D. Motor Oil and Gulflex A Grease

Gulf Dieselube H.D. not only provides a tough oil film and efficient lubrication, but has just the right amount of detergency to assure clean, smooth-working engines that squeeze out top mileage from every drop of fuel—and it prevents sticking of piston rings and valves.

Gulflex A is the lithium base, multi-purpose grease that does all these important lubrication jobs: chassis, springs, water pump, wheel bearings and universal joints. It saves time, saves on inventory and equipment and reduces lubrication costs.

Find out more about these two great products by getting in touch with your nearest Gulf office (consult your telephone directory), or write on your letterhead to Gulf Oil Corporation-Gulf Refining Company, 1822 Gulf Building, Pittsburgh 30, Pa.

The finest petroleum products for all your needs

GULF

Get a Quick, Safe Power Reserve... **BUY**

2-Million-Mile Road Test Proved Sta-ful Best

Two million miles of driving . . . equivalent to 80 times around the world . . . proves the ability of these batteries to really take punishment. More than 2 years ago 100 Auto-Lite Sta-ful Batteries were taken off the production line. Tamper-proof seals were installed on the caps, and the batteries were then installed in 17 different makes of cars in all parts of the U.S. and Canada. Over a 25-month period, the cars were driven a total of more than 2 million miles over all types of terrain and under all climatic conditions. The batteries were inspected at regular intervals in that period only by authorized personnel.

THE ELECTRIC AUTO-LITE COMPANY, TOLEDO 1, OHIO

AUTO-LITE STA-FUL—DRY CHARGED...

For More Economical Fleet Operation!

With fleet operators today, the swing is overwhelmingly to dry-charged batteries. To meet this fast-growing demand, Auto-Lite now offers its entire battery line, including Sta-ful, dry charged. There are good reasons for this:

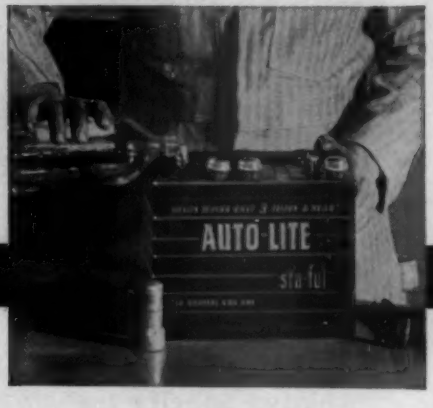
1—Dry-charged batteries can be bought in larger quantities and stored indefinitely.

2—They are ready for use and factory-fresh when you need them and do not require trickle-charging or recharging during storage.

3—It takes only minutes to prepare a dry-charged battery for use . . . and it is at full strength when installed.

Auto-Lite Sta-ful . . . standard among premium batteries the world over . . . is ideal for fleet use. You'll cut down service time considerably because Sta-ful, with 3 times the liquid reserve of ordinary batteries, needs water only ⅓ as often. And besides, they give long, dependable life . . . as proved by the grueling road test described below. Use Sta-ful Dry-Charged Batteries in your own fleet units. Your saving in service time will soon be proved.

As seen in picture at right, Auto-Lite "Activite" is packaged in completely leakproof bottles, and remains at full strength indefinitely. Dry-charged batteries can be activated in a few minutes.



Just check these results and see why you'll have less down-time and lower maintenance costs with Auto-Lite Sta-ful.

* **9 out of 10 batteries subjected to this test needed water only two times a year, and none needed water more than three times a year.**
* **Of the 100 batteries tested, *not one failed.***
* **At the end of 25 months of service, over 95% of the batteries exceeded the initial cold discharge voltage requirement of a new battery.**
* **Over 81% exceeded the initial cold capacity requirement of a new battery.**
* **Over 66% exceeded the initial 20-hour discharge requirement of a new battery.**

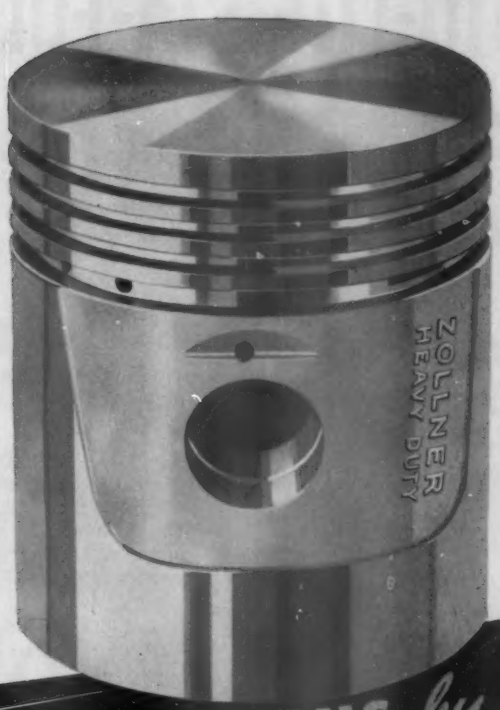
AUTO-LITE
sta-ful

NEEDS WATER ONLY ⅓ AS OFTEN

Auto-Lite manufactures over 400 products, including Spark Plugs, Batteries, Wire and Cable, and Automotive Electrical Systems . . . sold throughout the United States and Canada.

THE

ORIGINAL EQUIPMENT PISTON OF OVER 70% OF ALL TRUCK AND BUS MANUFACTURERS



ZOLLNER PISTONS

HEAVY DUTY PISTONS *by*

ZOLLNER

Proved by Fleet Records Everywhere
HIGHEST ENGINE PERFORMANCE
LOWEST MAINTENANCE COST

For reconditioning
Always Specify the
"ENGINEER APPROVED" PISTON

Expertly engineered pistons make a big difference in engine performance—and operating cost. That's why it's always best to insist on Zollner "Engineer-Approved" Pistons when reconditioning your engines. The big majority of engine manufacturers work hand-in-hand with Zollner engineers in the development of pistons best suited to heavy-duty use. Over 70% of all makes of trucks and buses are Zollner equipped — and have been for years. Only when you use Zollner can you be sure that your pistons are expertly designed and precision-made to individual engine specification for utmost performance and economy of operation.

ZOLLNER • FORT WAYNE, INDIANA

Torque Converters

Continued from page 37

converter fluid should be present to act as a partial lubricant and to dissipate heat.

Having the converter full of oil when the engine is started does two things—it avoids the tendency to churn oil and air throughout the system, and it accomplishes quick expulsion of air.

Prior to starting the engine, install a test pressure gate at the charging pump inlet connection on the converter case. Start the engine and run at a fast idle *only*. Don't operate above 1,000 rpm until pressure appears on the gage.

Now watch the pressure closely during this initial start . . .

- If pressure does not come up within three minutes the pump or suction line is probably defective.
- If pressure rises above 35 lbs at 1,000 rpm the pump relief valve spring is too strong, or the relief valve is stuck. Speed the engine up to full throttle and observe the gage. If the pressure rises above 60 lbs shut off the engine and check the relief valve in the charging pump.
- Check fluid flow in the reservoir while the engine is operating. Circulation should be moderately slow without excessive foaming.
- When the engine is shut off the pressure gage should drop quickly to zero. If it drops slowly, air is trapped in the system. Another check for air leakage in the suction line may be made at the reservoir with the engine shut down. Bubbling or gurgling of air back into the reservoir indicates that it has been trapped in the system. (When the engine is running, air will be compressed under pressure. However, when the engine is off, air will expand and force its way back into the reservoir.)

Normal idling pressure is 20-25 lbs, while 50 lbs is the maximum pressure you should get at any engine speed.

No pressure at idle could be caused by . . .

1. Relief valve stuck open or missing in pump.
2. Lip seal on pump shaft leaking air into pump.
3. Choke fitting missing from outlet of filter.
4. Low oil level in reservoir.
5. Suction line connection loose and leaking air.
6. Suction line closed off by obstruction.

To check the system and isolate the trouble, disconnect the suction line at the pump inlet. Connect a four-foot test line to the pump inlet and drop the other end into an oil container on the floor.

Start the engine and run at a fast idle while observing the pressure gage. If the pump primes itself and pressure rises to 20 lbs minimum, the pump is OK. It's the suction line or reservoir tube which is defective.

If the charging pump does not prime itself, race the engine and observe the gage. If the pressure rises, but falls off to near zero when engine speed drops to idle, check for missing or drilled-out choke fitting at converter filter outlet. If the fitting is alright, and pressure still will not stay on, replace the charging pump.

When the charging system checks out OK, remove the test gage and connect piping. Start the engine and check fittings, seal drains and flywheel housing for signs of leakage.

(The next two articles in this series on torque converter maintenance will deal with automatic shift, parts and controls and with general mechanical parts.)

ROCKWELL

ELECTRIC FARE REGISTERS

Measure your revenue ... Protect your Profits

A TYPE TO FIT ANY AUDITING SYSTEM

Made in two models—the locked vault type (shown) and the type which returns coins to driver after registration. Both machines total pennies, nickels, dimes and quarters on a single cash counter. Two sizes of tokens register in units on separate counters. Newly designed, wide angle inspection area provides utmost visibility. Mutilated coins and foreign objects are automatically trapped and rejected. Precision made, fully guaranteed. *Write for literature.*

Manufactured by

ROCKWELL MANUFACTURING COMPANY

Register Division Pittsburgh 8, Pa.

Nationally Distributed by

John D. McGuigan

616 So. Michigan Ave. Chicago 5, Ill.

1956 Buyer's Guide . . . continued from page 47

CRANKSHAFTS, FINISHED

Ohio Crankshaft Co., Cleveland, Ohio
Permalux Co., 900 W. Lake St., Chicago, Ill.
Wyman Gordon Co., Worcester, Mass.

DECALCOMANIAS—See also Stencils

American Decalcomania Co., 4326-5th Ave., Chicago 24, Ill.
Avery Paper Co., Painesville, Ohio
Excello Specialties Co., Cleveland, Ohio
*Meyercord Co., 5323 W. Lake St., Chicago 44, Ill.
Mid-West Decalcomanias, Chicago, Ill.
National Decalcomania Co., 236 N. 60th St., Phila., Pa.
Palm Bros. Co., Cincinnati 12, Ohio
Palm Fechteler & Co., Weehawken, N. J.
Permalux Co., Aurora, Ill.

DESCALERS

American Sand-Banum Co., 9 Rockefeller Plaza, New York, N. Y.
Brulin & Co., 2939 Columbia Ave., Indianapolis, Ind.
Butler Engineering Co., New Orleans, La.
Chemical Materials Corp., Terre Haute, Ind.
Electromotive Industries, Inc., Louisville, Ky.
Paint Remover Chemical Co., Cincinnati, Ohio
Stanley Co., John T., 642 W. 30th St., New York 16, N. Y.

DIFFERENTIALS—See Gears, Differential

DOOR OPERATING EQUIPMENT—See Operators, Door

DRUMS, BRAKE

Christiana Machine Co., Christiana, Pa.
Copperweld Steel Co., Glassport, Pa.
Dayton Steel Fdry. Co., Dayton 1, Ohio
Eaton Mfg. Co., Cleveland 10, Ohio
Erie Malleable Iron Co., Erie, Pa.
Frank Foundries Corp., Moline, Ill.
General Foundry & Mfg. Co., Flint, Mich.
*Gunite Foundries Corp., Rockford, Ill.
Homan & Co., Cincinnati, Ohio
Hunt-Spiller Mfg. Co., Boston, Mass.
Lempco Products, Inc., Bedford, Ohio
Motor Wheel Corp., Lansing, Mich.
*Reynolds Mfg. Co., Springfield, Mo.
*Timken-Detroit Axle Div., Ashtabula, Ohio

EXTINGUISHERS, FIRE

American-La France-Foamite Corp., Elmira, N. Y.
Ansul Chemical Co., Marinette, Wis.
AutoFyrstop Co., Philadelphia, Pa.
Bean Mfg. Co., John, Lansing, Mich.
Buffalo Fire Appliance Corp., Dayton, Ohio
Fyr-Fyter Co., Dayton, Ohio
General Detroit Corp., Detroit 7, Mich.
General Pacific Corp., 1501 E. Wash. Blvd., Los Angeles, Calif.
Kidde & Co., Walter, Belleville 9, N. J.
National Fire Extinguisher Co., 50 Rockefeller Plaza, New York 19, N. Y.
Pyrene-C. O. Two Mfg. Co., Newark 8, N. J.
Randolph Laboratories, Inc., 8 E. Kinzie St., Chicago 11, Ill.
Safety First Prods. Corp., Elmsford, N. Y.
Will-x Mfg. Corp., Brooklyn, N. Y.

FACINGS and PLATES, CLUTCH

Accurate Parts Mfg. Co., Cleveland, Ohio
*American Brake Shoe Co., American Brakeblok Div., Detroit, Mich.
Borg & Beck Div., Borg-Warner Corp., 6558 S. Menard Ave., Chicago, Ill.
*Clevite Service Inc., Cleveland, Ohio
Fibre & Metal Products, Inc., Downey, Calif.
General Metals Powder Co., Akron, Ohio
*Grey-Rock Div., Inc., Raybestos-Manhattan, Manheim, Pa.
*Johns-Manville, 22 E. 40th St., New York 16, N. Y.
*Lipe-Rollway Corp., Syracuse, N. Y.
*Long Mfg. Div. Borg-Warner Corp., Detroit, Mich.
*Raybestos Div. Raybestos-Manhattan, Inc., Bridgeport, Conn.
Russell Mfg. Co., Middletown, Conn.
*Spicer Mfg. Div. of Dana Corp., Toledo, Ohio
*Thermoid Co., Trenton, N. J.
*Wagner Electric Corp., St. Louis 14, Mo.
Wellman Co., S. K., Cleveland, Ohio

FANS, VENTILATING

Cincinnati Ventilating Co., Covington, Ky.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Diehl Mfg. Co., Elizabeth, N. J.
*Evans Products Co., Detroit 27, Mich.
Excell Auto Radiator Co., 320 E. 21st St., Chicago, Ill.
Hans Industries, Edmund, Detroit 4, Mich.
Lydon-Bricher Mfg. Co., St. Paul, Minn.
Samson United Corp., Rochester, N. Y.
Schwitzer-Cummins Inc., Indianapolis, Ind.
Sturtevant Div., Westinghouse Elec. Corp., Boston 36, Mass.

FASTENERS

American Screw Co., Providence, R. I. (Phillips)
Boots Aircraft Nut Corp., New Canaan, Conn.
Camloc Fastener Co., 420 Lexington Ave., New York, N. Y.
Cherry Rivet Div. Townsend Co., New Brighton, Pa.
Dorman Products Co., Cincinnati, Ohio
*du-Pont-Explosive Rivet Div., Wilmington, Del.
Elastic Stop Nut Corp., Union, N. J.
*Goodrich Co., B. F., Akron, Ohio
Huck Mfg. Co., Detroit 7, Ohio
Lamson & Sessions Co., Cleveland, Ohio
Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.
Republic Steel Corp., Cleveland, Ohio
Russell, Birdsal & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.
Shakeproof, Inc., 2565 N. Beeler Ave., Chicago 39, Ill.
South Chester Corp., Philadelphia 2, Pa.
Standard Pressed Steel Co., Jenkintown, Pa.
Tinnerman Products Inc., Cleveland 13, Ohio
Townsend Co., New Brighton, Pa.
United-Carr Fastener Corp., Cambridge, Mass.
Voi Shan Mfg. Co., 7452 Higuera St., Culver City, Calif.

FILLINGS, SEAT—See Seats, Spring or Rubber Cushions for

FILTERS, LUBRICATING and FUEL OIL

*A. C. Spark Plug Div., General Motors Corp., Flint, Mich.
American Bosch Corp., Springfield, Mass
Bowser, Inc., Fort Wayne 2, Ind.
Briggs Clarifier Co., Washington, D. C.
Champion Laboratories, Inc., Meriden, Conn.
Cuno Engineering Corp., Meriden, Conn.
DeLuxe Products Corp., La Porte, Ind.
Edde Mfg. Co., Milwaukee, Wis.
Fram Corp., Providence 16, R. I.
Hastings Mfg. Co., Hastings, Mich.
Indiana Commercial Filters, Lebanon, Ind.
Kiemm Automotive Products Co., 1718 N. Damen Ave., Chicago, Ill.
*Luber-Finer, Inc., Los Angeles 7, Calif.
Motor Economy Products, Inc., 107 W. 36th St., New York 18, N. Y.
Oil Purifier, Inc., Oakland, Calif.
Olixir Products, Inc., Buffalo, N. Y.
Pick Mfg. Co., West Bend, Wis.
*Purolator Products, Inc., Rahway, N. J.
Rega Mfg. Co., Rochester, N. Y.
Skinner Purifiers, Inc., Detroit, Mich.
Walker Mfg. Co., Racine, Wis.
W G B Oil Clarifier, Inc., Kingston, N. Y.
Winslow Engineering Co., Oakland 8, Calif.
*Wix Corp., Gastonia, N. C.

FILTERS, ENGINE COOLANT

Fram Corp., Providence 16, R. I.
Perry Co. Div. R. M. Hollingshead Corp., Camden, N. J.

FIXTURES and FITTINGS, LAMPS (Interior)

*Adams & Westlake Co., Elkhart, Ind.
Arrow Safety Device Co., Mt. Holly, N. J.
Columbus Metal Products, Inc., Columbus, Ohio
*Electric Service Mfg. Co., Philadelphia 32, Pa.
*Guide Lamp Div. General Motors Corp. Anderson, Ind.
*Luminator, Inc., 120 N. Peoria St., Chicago, Ill.
Monroe-Acme Co., 215 N. Aberdeen St., Chicago, Ill.

REBORE CONNECTING RODS IN YOUR OWN SHOP

New GREENLEE PRODUCTION MACHINERY

HYDRO-BORER

Assures precise alignment.
Accurate to .0003" T.I.R.
Fast precision boring.

Quick, easy setups.
For any size rods.
A money-maker in every engine shop.

WRITE FOR COMPLETE INFORMATION

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2186 MASON AVENUE
Rockford, Illinois

Rosen & Co., A. W., 1801 First Ave., New York, N. Y.
Troy Sunshade Co., Grant St., Troy, Ohio.
Visionator, Inc., 120 W. Peoria St., Chicago, Ill.

FLARES, FUSES, HIGHWAY

Anthes Force Oiler Co., Ft. Madison, Iowa
Arrow Safety Device Co., Mt. Holly N. J.
Bolser Corp., Cedar Falls, Iowa
Dietz Co., R. E., Syracuse, N. Y.
Economy Electric Lantern Co., Milwaukee 8, Wis.
Grote Mfg. Co., Bellevue, Ky.
K-D Lamp Co., Cincinnati, Ohio
Kilgore, Inc., Westerville, Ohio
Kilbourn-Sauer Co., Fairfield, Conn.
Miro-Flex Co., Wichita, Kan.
Pioneer Signal Light Corp., 5251 W. Imperial Blvd., Los Angeles 45, Calif.
Sparks Withington, Jackson, Mich.
U-C Lite Mfg. Co., 1050 W Hubbard St., Chicago 11, Ill.
U. S. Electric Mfg. Corp., 222 W. 14th St., New York 11, N. Y.
Vari Products Co., 2450 S. Prairie Ave., Chicago 16, Ill.

FLOORS, BUS—See Coverings, Floor

FLUID, HYDRAULIC BRAKE

Els Automotive Corp., Middletown, Conn.
•du Pont de Nemours & Co., E. I., Wilmington, Del.
•Moraine Prods. Div., General Motors Corp., Dayton, Ohio
Puritan Co., Rochester, N. Y.
•Wagner Electric Corp., St. Louis, Mo.
Warner Gear Div., Borg-Warner Corp Muncie, Ind.

FUEL and LUBRICANTS

Atlantic Refining Co., Philadelphia, Pa.
American Oil Co., Baltimore, Md.
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•Ethyl Gasoline Corp., 100 Park Ave., New York, N. Y.
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Warren Refining & Chemical Co., Cleveland 15, Ohio
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Littlefuse, Inc., 4757 Ravenswood Ave., Chicago 40, Ill.
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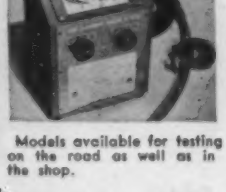

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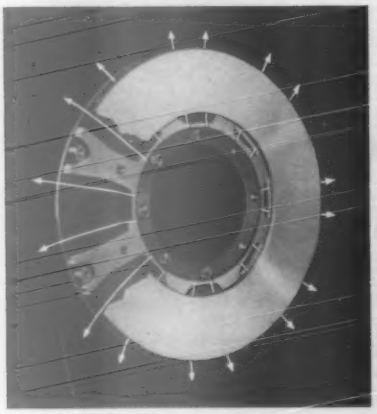

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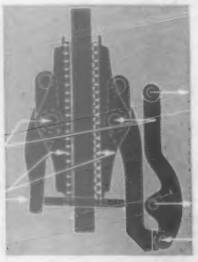

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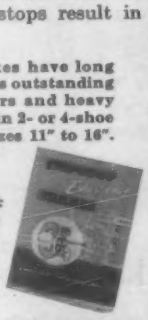

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Continued on page 96

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See the difference in the many friction materials Grey-Rock uses. For heavy jobs—Balanced Blocks in combinations of molded materials. For light trucks—Balanced Trucksets, in distinctive woven and molded combinations, or in all-woven or all-molded sets. All specially engineered for each make and model.

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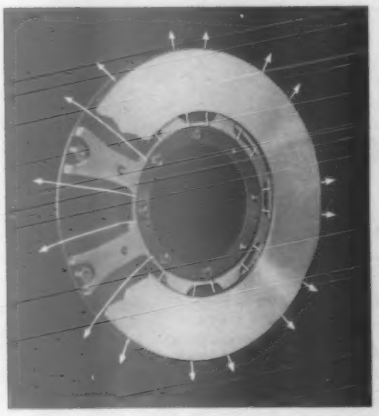

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Perfection Stove Co., Cleveland, Ohio
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INSERTS, THREAD REPAIR

*Heli-Coil Corp., Danbury, Conn.

INSULATION, BODY

Alfoil Insulation Co., 155 E. 44th St., New York 17, N. Y.
American Felt Co., Glenville, Conn.
American Hair & Felt Co., Merchandise Mart, Chicago 5A, Ill.
Armstrong Cork Co., Lancaster, Pa.
Burgess Battery Co., 500 W. Huron St., Chicago, Ill.
Celotex Corp., 919 N. Michigan Ave., Chicago 3, Ill.
Dow Chemical Co., Midland, Mich.
Dry-Zero Corp., Merchandise Mart, Chicago, Ill.
Felters Co., Boston, Mass.
Gustin-Bacon Mfg. Co., Kansas City, Mo.
Haskelite Mfg. Co., Grand Rapids, Mich.
Insulite Div., Minnesota & Ontario Paper Co., Minneapolis 2, Minn.
Libbey-Owens-Ford Co., Toledo, Ohio
L.O.F. Glass Fibres, Inc., Toledo, Ohio
Masonite Corp., 111 W. Washington St., Chicago, Ill.
Owens-Corning Fiberglass Corp., Toledo, Ohio
Philip Carey, Cincinnati, Ohio.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Seaman Paper Co., 220 W. Adams St., Chicago, Ill.

INSURANCE

American Mutual Ins. Co., Boston, Mass.
*American Transportation Ins. Co., Kansas City, Mo.
Continental Casualty Co., Chicago, Ill.
Joyce & Co., Inc., 309 W. Jackson, Chicago, Ill.
Liberty Mutual Ins. Co., Boston, Mass.
Markel Service, Inc., Richmond, Va.
Transportation Underwriters, Indianapolis, Ind.

JOINTS, UNIVERSAL

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.
Blood Bros. Machine Div., Rockwell Spring & Axle Co., Allegan, Mich.
Mechanics Universal Joint Div., Borg-Warner Corp., Rockford, Ill.
Morse Chain Co. Ithaca, N. Y.
New England Auto Products Corp., Pottstown, Pa.
New Process Gear, Inc., Syracuse, N. Y.
*Spicer Mfg. Div. of Dana Corp., Toledo, O.
Universal Products Co., Dearborn, Mich.

KITS, FIRST AID

Bauer & Black Div., Kendall Co., 2500 S. Dearborn St., Chicago, Ill.
Bullard Co., E. D., San Francisco, Calif.
Burroughs Welcome & Co., 9 E. 41st St., New York 17, N. Y.
Johnson & Johnson, New Brunswick, N. J.
Mine Safety Appliances Co., Pittsburgh, Pa.

KITS, THREAD REPAIR—See Inserts

LABELS, IDENTIFICATION

Brady Co., W. H., Milwauke 3, Wis.

LAMPS, FOG and DITCH

American Bosch Corp., Springfield, Mass.
Appleton Electric Co., 1701 W. Wellington Ave., Chicago, Ill.
Arrow Safety Device Co., Mt. Holly, N. J.
Auto Lamp Mfg. Co., 2909 Indiana Ave., Chicago 16, Ill.
Betts Mfg. Co., Warren, Pa.
Dietz Co., R. E., 225 Wilkinson St., Syracuse 1, N. Y.
Do-Ray Lamp Co., 1458 S. Michigan Ave., Chicago 5, Ill.
*Electric Auto-Lite Co., Toledo, Ohio
*Electric Service Mfg. Co., Philadelphia 32, Pa.
Griffin Lamp Co., Hamilton, Ohio
Grote Mfg. Co., Bellevue, Ky.
*Guide Lamp Div., G.M.C., Anderson, Ind.
K-D Lamp Co., Cincinnati, Ohio
Miro-Flex Co., Wichita, Kan.

S & M Lamp Co., Los Angeles 54, Calif.
Sparks Withington, Jackson, Mich.
Teleoptic Co., Racine, Wis.
Unity Mfg. Co., 2909 Indiana Ave., Chicago, Ill.
Yankee Metal Prods. Co., Norwalk, Conn.

LAMPS, HEAD, TAIL and MARKER

American Automatic Devices Co., 530 S. Throop St., Chicago, Ill.
Arrow Safety Device Co., Mt. Holly, N. J.
Auto Lamp Mfg. Co., 2909 Indiana Ave., Chicago 16, Ill.
Betts Mfg. Co., Warren, Pa.
Columbus Metal Prods. Co., Columbus, Ohio
Dietz Co., R. E., 225 Wilkinson St., Syracuse, N. Y.
Do-Ray Lamp Co., 1458 S. Michigan Ave., Chicago 5, Ill.
*Electric Auto-Lite Co., Toledo, Ohio
*Electric Service Mfg. Co., Philadelphia, 32, Pa.
General Elec. Co., Cleveland, Ohio
Griffin Lamp Co., Hamilton, Ohio
Grote Mfg. Co., Bellevue, Ky.
*Guide Lamp Div., General Motors Corp., Anderson, Ind.
Hall Lamp Co., C. M., Detroit 7, Mich.
K-D Lamp Co., Cincinnati, Ohio
Monroe-Acme Co., 215 N. Aberdeen St., Chicago, Ill.
Signal Stat Corp., Brooklyn, N. Y.
S & M Lamp Co., Los Angeles 54, Calif.
Sparks-Withington Co., Jackson, Mich.
Trippe Mfg. Co., 609 W. Lake St., Chicago, Ill.
Vari Products Corp., 2450 S. Prairie Ave., Chicago 16, Ill.
Yankee Metal Prods. Co., Norwalk, Conn.

LAMPS, INTERIOR—See Fixtures and Fittings, Lamp

LAMPS, MINIATURE INCANDESCENT

General Electric Co., Lamp Dept., Cleveland 12, Ohio
Herzog Miniature Lamp Works, Long Island City, N. Y.
National Carbon Co., 30 E. 42nd St., New York 17, N. Y.
North American Electric Lamp Co., St. Louis 6, Mo.
Sylvania Electric Products Co., 500 Fifth Ave., New York 18, N. Y.
Trippe Mfg. Co., 609 W. Lake St., Chicago, Ill.
*Tung-Sol Electric Corp., Newark 4, N. J.
Westinghouse Electric Corp., Bloomfield, N. J.

LININGS and BLOCKS, BRAKE

*American Brake Shoe Co., American Brakeblok Div., Detroit, Mich.
Anchor Packing Co., Philadelphia, Pa.
Asbestos Mfg. Co., Huntington, Ind.
Atlas Asbestos Co., North Wales, Pa.
*Bendix Marshall-Eclipse, Troy, N. Y.
Fibre & Metal Products, Inc., Downey, Calif.
*Firestone Tire & Rubber Co., Akron, Ohio
Gatke Corp., 228 N. LaSalle St., Chicago, Ill.
General Metals Powder Co., Akron, Ohio
*Goodyear Tire & Rubber Co., Akron 18, Ohio
*Grey-Rock Div., Raybestos-Manhattan, Inc., Manheim, Pa.
Grizzly Mfg. Co., Paulding, Ohio
*Inland Mfg. Div., General Motors Corp., Dayton, Ohio
*Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Lasco Brake Product Corp., Ltd., 2619 Magnolia St., Oakland, Calif.
Manhattan Rubber Mfg. Div., Raybestos-Manhattan, Inc., Passaic, N. J.
Miley Co., L. J., 1060 W. Adams St., Chicago, Ill.
Molded Materials, Inc., Philadelphia, Pa.
*Raybestos Div., Raybestos-Manhattan, Inc., Bridgeport, Conn.
Reddaway Brake Lining Co., Newark, N. J.
Russell Mfg. Co., Middletown, Conn.
Scandinavia Belting Co., Newark, N. J.
Southern Friction Materials Co., Charlotte, N. C.
*Thermoid Co., Trenton, N. J.
*Wagner Electric Corp., St. Louis 14, Mo.
Wellman Co., S. K., Cleveland, Ohio
World Bestos Corp., New Castle, Ind.

LUBRICATORS—See Pumps and Injectors

MACHINES, VENDING

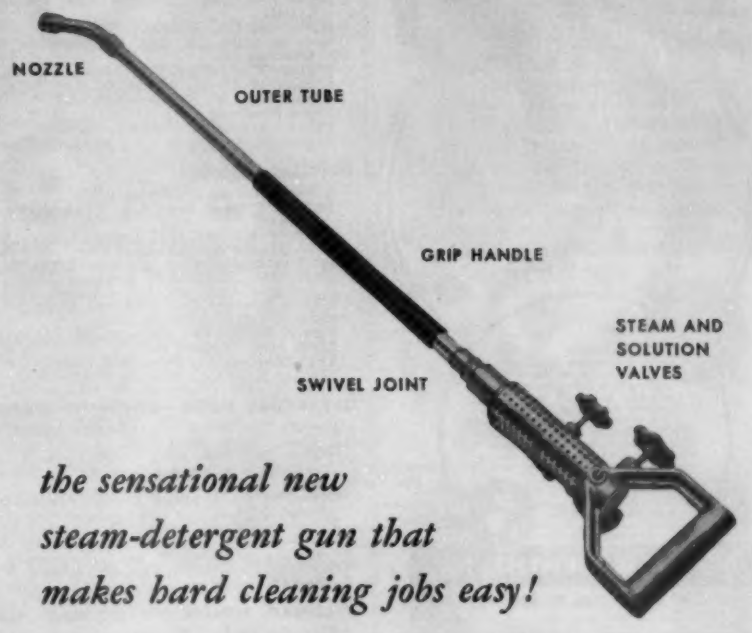
Transportation Vendors, Inc., 60 Park Pl., Newark 2, N. J.

MIRRORS, REAR VISION

Acme Specialty Mfg. Co., Toledo, Ohio

Continued on next page

OAKITE
"HURRICLEAN" GUN



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American Automatic Devices Co., 530 S. Throop St., Chicago, Ill.
Anzell Specialty Mfg. Co., Brooklyn, N. Y.
Arrow Safety Device Co., Mt. Holly, N. J.
Auto Lamp, Chicago, Ill.
Dietz Co., R. E., 225 Wilkinson St., Syracuse 1, N. Y.
Do-Ray Lamp Co., 1458 S. Michigan Ave., Chicago 5, Ill.
*Electric Service Mfg. Co., Philadelphia 32, Pa.
Griffin Lamp, Hamilton, Ohio
Grote Mfg. Co., Bellevue, Ky.
K-D Lamp Co., Cincinnati, Ohio
Kippley & Lee, 1310 18th Ave., Oakland 6, Calif.
Miro-Flex Co., Wichita, Kan.
Monroe-Acme Co., 215 N. Aberdeen St., Chicago, Ill.
Sparks-Withington Co., Jackson, Mich.
Speaker & Co., J. W., Milwaukee, Wis.
Stout Mfg. Co., Connersville, Ind.
Trico Products Corp., Buffalo, N. Y.
Unity Lamp Co., Chicago, Ill.
Yankee Metal Prods. Co., Norwalk, Conn.

MUFFLERS, EXHAUST

A. P. Parts Co., Toledo, Ohio
Buffalo Pressed Steel Co., Youngstown 9, Ohio
Burgess Battery Co., Acoustic Div., 500 W. Huron St., Chicago, Ill.
International Nickel Co., New York, N. Y.
Maremont Automotive Products, Inc., S. Ashland Ave., at 17th, Chicago, Ill.
Maxim Silencer Co., Hartford, Conn.
*McCord Corp., Detroit, Mich.
Powell Muffler Co., Chicago, Ill.
River Mfg., Toledo, Ohio
Tech Muffler Co., Columbus, Ohio
Walker Mfg. Co., Racine, Wis.

OPERATORS, DOOR—Air-Electric-Manual

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.
Broten Controls, Inc., Rahway, N. J.
Cleveland Hardware & Forging Co., Cleveland, Ohio
*Consolidated Metal Products Corp., Albany, N. Y.
Electrol, Inc., Kingston, N. Y.
*Midland Steel Products Co., Detroit 11, Mich.
*National Pneumatic Co., 125 Amory St., Boston, Mass.

OVERHEAD, TROLLEY BUS

*Earll Co., C. I., York, Pa.
*Ohio Brass Co., Mansfield, Ohio
Westinghouse Elec. Corp., Pittsburgh, Pa.

OXYGEN and GAS, COMPRESSED

Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y.
Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.
Prest-O-Lite Co., 30 E. 42nd St., New York 17, N. Y.
Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

PAINT, ENAMEL and LACQUER

Acme White Lead & Color Works, Detroit, Mich.
American-Marietta Co., East Ohio St., Chicago 11, Ill.
Arco Co., Cleveland, Ohio
Andrew Brown Co, 5431 S. District Blvd., Los Angeles, Calif.
Ditzler Color Div., Pittsburgh Plate Glass Co., Detroit, Mich.
Dolphin Paint & Varnish Co., Toledo, Ohio
*du Pont de Nemours & Co., E. I., Wilmington, Del.
Egyptian Lacquer Mfg. Co., 1270 Sixth Ave., New York, N. Y.
Fuller & Co., W. P., San Francisco 5, Calif.
Glidden Co., Cleveland 14, Ohio
Hercules Powder Co., 959 King St., Wilmington 99, Del.
Interchemical Corp., Newark 1, N. J.
Martin-Senour Co., 2520 Quarry, Chicago 8, Ill.
McDougall-Butler Co., Buffalo, N. Y.
Midland Paint & Varnish Co., Cleveland 5, Ohio
Monsanto Chem. Co., Merrimac Div., Boston, Mass.
Nason & Co., R. N., San Francisco 3, Calif.
Pabco Products Inc., San Francisco, Calif.
Patterson Sargent Co., Cleveland, Ohio
*Pittsburgh Plate Glass Co., Pittsburgh 22, Pa.
Pratt & Lambert, Inc., Buffalo, N. Y.
Rinshed-Mason Co., Detroit 10, Mich.
Sherwin-Williams Co., Cleveland 1, Ohio
Sonneborn Sons, L., 88 Lexington Ave., New York, N. Y.
Valentine & Co., 11 E. 36th St., New York 16, N. Y.
Walker Co., H. V., Elizabeth, N. J.
Zapon Div. Atlas Powder Co., Stamford, Conn.

PANELS and FABRICATIONS, BODY

Alan Wood Steel Co., Conshohocken, Pa.
Algoma Plywood & Veneer Co., Algoma, Wis.
*Aluminum Co. of America, Pittsburgh 19, Pa.
American Hair & Felt Co., Merchandise Mart, Chicago, Ill.
American Rolling Mills Co., Middletown, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Buhelen Lumber & Mfg. Co., Tacoma, Wash.
Formica Insulation Co., Cincinnati 32, Ohio
Great Lakes Steel Co., Ecorse, Mich.
Harbor Plywood Corp., Hoquiam, Wash.
Hart Metal Products Co., Elkhart, Ind.
*Haskelite Mfg. Corp., Grand Rapids 2, Mich.
International Nickel Co., 67 Wall St., New York 5, N. Y.
*Kaiser Aluminum & Chemical Sales Corp., Oakland, Calif.
Masonite Co., 111 W. Washington St., Chicago, Ill.
Nicralumin Co., Wilmington, Del.
Noblitt-Sparks Industries, Columbus, Ind.
Republic Steel Corp., Cleveland 1, Ohio
*Reynolds Metals Co., Louisville, Ky.
*Rigidized Metals Corp., 6726 Ohio St., Buffalo, N. Y.
St. Regis Paper Co., 230 Park Ave., New York 17, N. Y.
Snedaker & Co., F. C., Philadelphia 40, Pa.
Superior Sheet Steel Co., Canton, Ohio
U. S. Plywood Corp., 616 W. 46th St., New York 19, N. Y.
U. S. Steel Corp., Pittsburgh, Pa.
Washington Veneer Co., Olympia, Wash.
Youngstown Sheet & Tube Co., Youngstown, Ohio

PANELS, FUSE and JUNCTION BLOCKS

Rohden Mfg. Co., 4739 Montrose Ave., Chicago 41, Ill.

PISTONS and PINS

*Aluminum Co. of America, Pittsburgh 19, Pa.
Aluminum Industries, Inc., Cincinnati 25, Ohio
Arrow Head Steel Products Co., Howell, Mich.
Burgess-Norton Mfg. Co., Geneva, Ill.
Deluxe Products Corp., La Porte, Ind.
D.S.C. Industries, Inc., Medina, Ohio
Elgin Machine Works, Elgin, Ill.
Gillett & Eaton, Inc., Lake City, Minn.
King Quality Products Co., St. Louis, Mo.
McQuay-Norris Mfg. Co., St. Louis, Mo.
Ohio Piston Corp., Cleveland, Ohio
*Sealed Power Corp., Muskegon, Mich.
Thompson Products, Inc., Cleveland 3, Ohio
*Toledo Steel Products Co., Toledo 1, Ohio
United Engine & Mach. Co., San Leandro, Calif.
Wisconsin Machinery & Mfg. Co., West Allis, Wis.
*Zollner Mach. Works, Fort Wayne, Ind.

PLATES, STEP (Non-Skid)

Alan Wood Steel Co., Conshohocken, Pa.
American Abrasive Metals Co., Irvington., N. J.
*Attwood Brass Works, Grand Rapids 4, Mich.
Boston Woven Hose & Rubber Co., Cambridge, Mass.
Melflex Products Co., Akron 3, Ohio
*Moore & Co., Sam, Mantua, Ohio
Monroe-Acme Co., 215 N. Aberdeen St., Chicago, Ill.
Morton Mfg. Co., 5105 W. Lake St., Chicago 44, Ill.
Turner Brass Works, Sycamore, Ill.

PLOWS, SNOW

Flink Co., Streator, Ill.
Good Roads Machinery Corp., Kennett Square, Pa.
Walter Truck Co., Brooklyn, N. Y.

POLISH, BODY and METAL

Commercial Chem. Co., Charlestown, Mass.
*du Pont de Nemours & Co., E. I., Wilmington, Del.
Franko Super Polish Products, Lyndhurst, N. J.
*Hollingshead Corp., R. M., Camden, N. J.
Jewel Paint & Varnish Co., 345 N. Western Ave., Chicago, Ill.
Minnesota Mining & Mfg. Co., St. Paul 6, Minn.
Paul & Co., J. C., 930 Roscoe St., Chicago, Ill.
Park Chemical Co., Detroit, Mich.
Permatex Co., Brooklyn 35, N. Y.
Puritan Co., Rochester, N. Y.
Robertson Products Co., Theo. B., 700 W. Division, Chicago, Ill.

Sherwin-Williams Co., Cleveland 1, Ohio
Simonix Co., 2100 S. Indiana Ave., Chicago 16, Ill.
Sno-Flake Products Co., Detroit, Mich.
Stanley Co., J. T., 642 W. 30th St., New York 16, N. Y.
Wilson Imperial Co., Newark, N. J.
Zinc Corp., Howard, Fremont, Ohio

PUMPS and INJECTORS, FUEL and LUBE

*A. C. Spark Plug Div., General Motors Corp., Flint, Mich.
American Bosch Corp., Springfield, Mass.
American Diesel Service, 7606 Lorain Ave., Cleveland 2, Ohio
Automotive & Marine Products Co., Boston, Mass.
Autopulse Corp., Ludington, Mich.
*Bendix, Eclipse Machine, Elmira, N. Y.
Carter Carburetor Corp., St. Louis, Mo.
Emerol Mfg. Co., 242 W. 69th St., New York, N. Y.
*Evans Products Co., Detroit 27, Mich.
Ex-Cell-O Corp., Detroit, Mich.
Stewart-Warner Corp., 1828 W. Diversey Parkway, Chicago 14, Ill.

PLYWOOD-MOLDED SHAPES

United States Molded Shapes, Inc., Grand Rapids, Mich.

RADIATORS, ENGINE COOLING

Excel Auto Radiator Co., 320 E. 21st Chicago, Ill.
Fedders Mfg. Co., Buffalo, N. Y.
Fleet Sales & Service Co., Mt. Vernon, N. Y.
G & O Mfg. Co., New Haven, Conn.
Harrison Radiator Div., General Motors Corp., Lockport, N. Y.
Lasko Metal Products, West Chester, Pa.
Lake Auto Radiator Mfg. Co., The, Cleveland 3, Ohio
*Long Mfg. Div., Borg-Warner Corp., Detroit, Mich.
*McCord Corp., Detroit, Mich.
Modine Mfg. Co., Racine, Wis.
Perfex Corp., Milwaukee, Wis.
Young Radiator Co., Racine, Wis.

RADIO and ACCESSORIES, MOBILE

Andrew Corp., Chicago, Ill.
Bendix Aviation Corp., Towson, Md.
Communications Co., Coral Gables, Fla.
Farnsworth Television Radio Corp., Fort Wayne 1, Ind.
Federal Telephone & Radio Corp., Clifton, N. J.
General Electric Co., Syracuse, N. Y.
Hallett Mfg. Co., Inglewood, Calif.
Link Radio Corp., 125 W. 17th St., New York, N. Y.
*Mid-West Audio Service, Box 354, Park Ridge, Ill.
Motorola Inc., 4545 W. Augusta Blvd., Chicago, Ill.
Radio Corp. of America, Camden, N. J.
Sylvania Electric Products, Inc., Salem, Mass.
Transit Radio, Cincinnati 14, Ohio
Westinghouse Elec. Corp., Pittsburgh Pa.
Zenith Radio Corp., 6000 Dickens Ave., Chicago, Ill.

REGISTERS and DEVICES, FARE COLLECTING

Advance Products Co., Detroit, Mich.
Burroughs Adding Mach. Co., Detroit, Mich.
*Electric Service Mfg. Co., Philadelphia 32, Pa.
Galef & Son, J. L., 85 Chambers St., New York, N. Y.
General Register Co., Long Island City, N. Y.
*Grant Money-Meters Co., Providence, R. I.
International Register Co., 2620 Washington Blvd., Chicago, Ill.
*Johnson Fare Box Co., 4619 N. Ravenswood Ave., Chicago, Ill.
Knopf Inst. Co., Jersey City, N. J.
Lannon Products Corp., Nashville 3, Tenn.
Main Farebox Co., Willoughby, Ohio
Oliver Mach. Tool Co., 520 S. Michigan Ave., Chicago 11, Ill.
*Perey Turnstile Co., 101 Park Ave., New York 17, N. Y.
*Rockwell Register Corp., Belle Fonte, Ohio
Veeder-Root, Inc., Hartford 2, Conn.

RINGS, PISTON

Aluminum Industries, Inc., Cincinnati 25, Ohio
American Hammered Piston Ring, Div. Muskegon, Mich.
Arrow Head Steel Prod. Co., Howell, Mich.
Burd Piston Ring Co., Rockford, Ill.
Cord's Piston Rings, 1351 S. Olive St., Los Angeles 15, Calif.
Grant & Grant, 241 N. Westmoreland, Los Angeles, Calif.
*Hastings Mfg. Co., Hastings, Mich.
King Quality Products Co., St. Louis, Mo.
McQuay-Norris Mfg. Co., St. Louis, Mo.
Hoog-St. Louis Piston Ring Co., St. Louis, Mo.
*Perfect Circle Co., Hagerstown, Ind.
Ramsey Accessories Mfg. Corp., St. Louis, Mo.
*Sealed Power Corp., Muskegon, Mich.
Simplex Products Corp., Cleveland, Ohio
Thompson Mfg. Co., Peoria, Ill.
Thompson Products, Inc., Cleveland 3, Ohio
Toledo Steel Products Co., Cleveland 3, Ohio
U. S. Hammered Piston Ring Co., Sterling, N. J.
Wausau Motor Parts Co., Wausau, Wis.
Wilkening Mfg. Co., Philadelphia, Pa.

RODS, CONNECTING

*Federal-Mogul Corp., Detroit 13, Mich.
Janibor Tool & Stamping Co., Milwaukee, Wis.
Morris, Inc., J. Leslie, Los Angeles 33, Calif.
Niagara Motors Corp., Dunkirk, N. Y.

RUBBER TO METAL BONDING

*Motor Devices Corp., 772 Tenth Ave., New York 17, N. Y.
Metro Rubber Products Corp., Oak Lawn, Ill.

SANDERS, HIGHWAY

Anderson Mach. & Tool Wks. Inc., Chaska, Minn.
Connecticut Telephone & Electric Corp., Meriden, Conn.
Elston Corp., St. Paul, Minn.
Flink Co., Streator, Ill.
Good Roads Machinery Corp., Kennett Square, Pa.
Highway Safety Appliance Co., St. Paul 4, Minn.
Lintern Corp., Ashtabula, Ohio
Power Sander Inc., Minneapolis, Minn.
Sterling Tool Products Co., 363 E. Ohio St., Chicago, Ill.
Tarrant Mfg. Co., Saratoga Springs, N. Y.
Walter Motor Truck Co., Brooklyn, N. Y.
Westlake Mfg. Corp., Canastota, N. Y.

SASH, WINDOW

*Adams & Westlake Co., Elkhart, Ind.
*Edwards Co O. M., Syracuse, N. Y.
Excel Corp., Elkhart, Ind.
Transportation Sash Co., Topton, Pa.
Troy Sunshade Co., Grant St., Troy, Ohio.
Visionator, Inc., Chicago 80, Ill.
Young Windows, Inc., Philadelphia 40, Pa.

SEALS and RINGS, OIL

Chicago Rawhide Mfg. Co., 1281 Elston Ave., Chicago, Ill.
Felt Products Mfg. Co., 1508 Carroll Ave., Chicago 7, Ill.
Fitzgerald Mfg. Co., Torrington, Conn.
Mechanex Corp., 1144 Broadway, Denver, Colo.
National Motor Bearing Co., Redwood City, Calif.
Victor Gasket, Chicago, Ill.

SEATS

*American Seating Co., Grand Rapids, Mich.
Eckland Bros. Co., Minneapolis, Minn.
General Seating Co., Topton, Pa.
*Heywood-Wakefield Co., Gardner, Mass.
*Ionia Mfg. Co., Ionia, Mich.
McArthur Corp., Warren, 1 Park Ave., New York 16, N. Y.
National Seating Co., 624 S. Michigan Ave., Chicago 15, Ill.
*Sam Moore & Co., Mantua, Ohio
Troy Sunshade Co., Grant St., Troy, Ohio

SEATS, SPRING or RUBBER CUSHIONS for

Armour Curled Hair Work., Div. Armour & Co., 1355 W. 31st St., Chicago, Ill.
Atkinson Spring Co., F. R., Hamburg, N. Y.
Blocksom & Co., Michigan City, Ind.
Burkhart Mfg. Co., F. St. Louis, Mo.
Dunlop Tire & Rubber Corp., Buffalo, N. Y.
Firestone Industrial Products Co., Akron, Ohio
*Goodyear Tire & Rubber Co., Akron 16, Ohio
Hewitt Rubber Corp., Buffalo, N. Y.
Kool Kooshion Inc., 239 S. Prince, Littletown, Colo.
McInerney Spring & Wire Co., Grand Rapids, Mich.
Nukraft Mfg. Co., Shelbyville, Ind.
Owen Silent Spring Co., Bridgeport, Conn.
Royersford Spring Co., Royersford, Pa.

Continued on next page

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LUBER-FINER, INC.
2514 S. Grand Ave., Los Angeles 7

Sponge Rubber Products Co., Derby, Conn.
*U. S. Rubber Co., Mishawaka, Ind.
Woll & Co., F. P., Philadelphia, Pa.

SEATS, VALVE (Replacement)

*Albertson & Co., Sioux City, Iowa
Cedar Rapids Engrg. Co., Cedar Rapids, Iowa
Lee Co., K. O., Aberdeen, S. D.
Peterson Welding Laboratories, Kansas City 6, Mo.
Thompson Products, Inc., Cleveland 3, Ohio

SHAFTS, AXLE and PROPELLER

Automotive Gear Works, Richmond, Ind.
Brandt-Warner Mfg. Co., York, Pa.
Champ-Items, Inc., St. Louis, Mo.
Eaton Mfg. Co., Cleveland, Ohio
Foote Axle & Forge Co., Los Angeles 33, Calif.
Foreman Mfg. Co., 5353 S. State St., Chicago 9, Ill.
Lempco Products, Inc., Bedford, Ohio
Micro Test Gear Co., Indianapolis, Ind.
Morse Chain Co., Ithaca, N. Y.
Standard Forge & Axle Co., Montgomery, Ala.
*Timken-Detroit Axle Div., Detroit, Mich.
U. S. Axle Co., Pottstown, Pa.

SHIMS, LAMINATED

Laminated Shim Co., Glenbrook, Conn.
National Motor Bearing Co., Redwood City, Calif.

SHOCK-ABSORBERS

*Delco Products Div., General Motors Corp., Dayton, Ohio
*Gabriel Co., Cleveland, Ohio
Houde Engineering Div., Houdaille-Industries, Buffalo, N. Y.
Monroe Auto Eqpt. Co., Monroe, Mich.
*National Pneumatic Co., 125 Amory St., Boston, Mass.
*National Transport Supply, Inc., 545 E. Hancock, Detroit 1, Mich.

SHUTTERS, RADIATOR

Brewer-Titchener Corp., Cortland, N. Y.
Cadillac Co., Coldwater, Mich.
Kysor Heater Co., Cadillac, Mich.

SIGNALS, DIRECTIONAL and STOP

American Automatic Devices Co., 530 S. Throop St., Chicago, Ill.
American Bosch Corp., Springfield, Mass.
Arrow Safety Device Co., Mt. Holly, N. J.
Auto Lamp Mfg. Co., 2909 Indiana Ave., Chicago 16, Ill.
Betts Mfg. Co., Warren, Pa.
Carpenter Mfg. Co., E. W., Bridgeport 1, Conn.
Carolina Metal Products, Inc., Charlotte, N. C.
Columbus Metal Prods. Co., Columbus, Ohio
Dietz Co., R. E., 225 Wilkinson St., Syracuse, N. Y.
Do-Ray Lamp Co., 1458 S. Michigan Ave., Chicago, Ill.
*Electric Auto-Lite Co., Toledo, Ohio
*Electric Service Mfg. Co., Philadelphia 32, Pa.
Griffin Lamp Co., Hamilton, Ohio.
*Guide Lamp Div., General Motors Corp., Anderson, Ind.
K-D Lamp Co., Cincinnati, Ohio
Macchi & Co., 819 Valencia St., San Francisco, Calif.
Marion Truck Eqpt. Co., 2030 S. State St., Chicago 16, Ill.
Protectal Motor Signal Co., Syracuse N. Y.
Safety Turn Signal, 4659 N. Clark St., Chicago, Ill.
Signal-Stat Corp., Brooklyn, N. Y.
Sparks-Withington Co., Jackson, Mich.
Taylor Eng. Co., E. C., Tuckahoe, N. Y.
Yankee Metal Products Corp., Norwalk, Conn.

SIGNALS, FILL

Scully Signal Co., Cambridge 41, Mass.

SIGNALS, PASSENGER STOP

*Consolidated Metal Products Corp., Albany, N. Y.
*Delco-Remy Div. General Motors Corp., Anderson, Ind.
*Electric Service Mfg. Co., Philadelphia 32, Pa.
Faraday Electric Corp., Adrian, Mich.
Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y. (Jobbers)
Jessail Plastic, Inc., Hartford, Conn.

SIGNALS, WARNING (Horns, Air and Electric Types)

American Bosch Corp., Springfield, Mass.
*Bendix-Westinghouse Automotive Air Brake Co., Elyria, Ohio
Buell Horn, Chicago, Ill.
*Delco-Remy Div., General Motors Corp., Anderson, Ind.
*Electric Auto-Lite Co., Toledo, Ohio
*Electric Service Mfg. Co., Philadelphia, Pa.
Grover Products Co., 221 S. Hope St., Los Angeles 15, Calif.
Monroe Standard, Inc., Galion, Ohio
Sparks-Withington Co., Jackson, Mich.

SIGNS, DESTINATION

*Electric Service Mfg. Co., Philadelphia 32, Pa.
Hunter Illuminated Car Sign Co., Flushing, N. Y.
Railway Utility Co., 2241 S. Indiana Ave., Chicago, Ill.

SOAP & DETERGENTS

Colgate-Palmolive-Peet Co., Jersey City, N. J.
Cudahy Packing Co., 221 N. La Salle St., Chicago, Ill.
Drew & Co., E. F., 15 E. 26th St., New York, N. Y.
Fine Organics, Inc., 211 E. 19th St., New York, N. Y.
Hollingshead Corp., R. M., Camden, N. J.
Kelite Products, Inc., Los Angeles 1, Calif.
Miller Mfg. Co., Camden, N. J.
Oronite Chemical Co., 38 Sansome St., San Francisco 4, Calif.
Procter & Gamble Co., Cincinnati, Ohio
Puritan Co., Rochester, N. Y.
Robertson Products Co., Thos. B., 700 W. Division St., Chicago, Ill.
Safety & Maintenance Co., 1 Wall St., New York, N. Y.
Stanley Co., John T., 624 West 30th St., New York 16, N. Y.
Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif.

SOLDER

Allen & Co., L. B., 6727 W. Bryn Mawr Ave., Chicago, Ill.
American Smelting & Ref. Co., 120 Broadway, New York, N. Y.
Crown Aluminum Solder Co., 883 E. 134th St., New York, N. Y.
Gardiner Metal Co., 4843 S. Campbell Ave., Chicago 32, Ill.
Kester Solder Co., 4201 Wrightwood Ave., Chicago 39, Ill.
Lenk Mfg. Co., Newton Lower Falls, Mass.
Rocket Distributors, Inc., Bayside, L. I., N. Y.

SOLUTIONS, PARTS CLEANING

Bruiln & Co., 2939 Columbia Ave., Indianapolis, Ind.
Chemicals-Materials, Terre Haute, Ind.
Curran Corp., Malden, Mass.
Detrex Corp., Detroit, Mich.
Fine Organics, Inc., 211 E. 19th St., New York, N. Y.
Ford Co., J. B., Wyandotte, Mich.
Fre-eze Products Co., Atlanta 3, Ga.
Gerlach Co., E. A., Philadelphia 40, Pa.
Kelite Products, Inc., Los Angeles 1, Calif.
Lavo Co. of America, Milwaukee, Wis.
MacDermid, Inc., Waterbury, Conn.
*Magnus Chemical Co., Garwood, N. J.
Magnuson Prod. Corp., Brooklyn, N. Y.
*Oakite Products, Inc., 22 Thames St., New York 6, N. Y.
Pennsylvania Refining Co., Cleveland 4, Ohio
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Rust Master Chem. Co., Boston, Mass.
Safety & Maintenance Co., 1 Wall St., New York, N. Y.
Solventol Chem. Products, Inc., Detroit, Mich.
Stanley Co., J. T., 642 W. 30th St., New York 16, N. Y.
Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif.
Wyandotte Chemicals Corp., Wyandotte, Mich.

SPARK PLUGS

*A. C. Spark Plug Div., General Motors Corp., Flint, Mich.
American Bosch Corp., Springfield, Mass.
Auburn Spark Plug Co., Auburn, N. Y.
*Belden Mfg. Co., Chicago, Ill.
*Bowers Battery & Spark Plug Co., Reading, Pa.
B. G. Corp., 136 W. 52nd St., New York, N. Y.
Blue Crown Spark Plug Co., 1800 W. Winnemac, Chicago, Ill.
Champion Spark Plug Co., Toledo, Ohio
*Electric Auto-Lite Co., Toledo, Ohio
*Firestone Tire & Rubber Co., Akron, Ohio
Globe-Union, Inc., Milwaukee, Wis.
Hastings Mfg. Co., Hastings, Mich.
Jet Ignition Co., The, Larchmont, N. Y.
Marvron Inc., Washington, D. C.
U. S. Ignighter Corp., Philadelphia, Pa.

SPEEDOMETERS, ODOMETERS, TACHOMETERS

*A. C. Spark Plug Div., General Motors Corp., Flint, Mich.
Bendix Pioneer Instrument Co., Bendix, N. J.
Corbin Screw Corp., New Britain, Conn.
Cramer & Co., R. W., Centerbrook, Conn.
*Electric Auto-Lite Co., Toledo, Ohio
Engler Instrument Co., 255 Culver Ave., Jersey City, N. J.
General Electric Co., Schenectady 5, N. Y.
Jones-Motrola, Stamford, Conn.
Knopf Instrument Co., Jersey City, N. J.
Stewart-Warner Corp., 1328 W. Diversey Pkwy., Chicago 14, Ill.
Sun Electric Mfg. Co., Chicago, Ill.
Veeder-Root, Inc., Hartford 2, Conn.
*Wagner Electric Corp., St. Louis 14, Mo.
Weston Electrical Instrument Co., Newark 5, N. J.

SPRING, BUS (Leaf & Air)

Atkinson Spring Co., F. R., Hamburg, N. Y.
Delco Product, Div. of G.M.C., Dayton, Ohio
Eaton Mfg. Co., Cleveland, Ohio
Harvey Spring & Forging Co., Racine, Wis.
*General Tire & Rubber Co., The, Akron, Ohio (Air Spring)
Iron City Spring Co., Pittsburgh, Pa.
Laher Spring & Tire Corp., 2619 Magnolia St., Oakland, Calif.
Maremont Automotive Products, Inc., S. Ashland St., at 17th, Chicago, Ill.
Mather Spring Co., Toledo, Ohio
Merrill Spring Co., 530 W. 28th St., New York 1, N. Y.
Rowland, Inc., W. & H., Philadelphia, Pa.
St. Louis Spring Co., St. Louis, Mo.
Service Spring Co., Indianapolis, Ind.
Standard Steel Spring Co., Corapolis, Pa.
Trainor National Spring Co., New Castle, Ind.
Tuthill Spring Co., 760 W. Polk St., Chicago, Ill.
U. S. Spring & Bumper Co., Los Angeles 11, Calif.

STAMPINGS—See Panels

STENCILS

Dicks Co., C. O., Detroit, Mich.

SUPPLEMENTS, FUEL

Bell Laboratory, Inc., Orlando, Fla.
Wilco Co., 4425 Bandini Blvd., Los Angeles, Calif.

TANKS, AUXILIARY OIL

Walden, Inc., S. L., Philadelphia, Pa.

TAPE, MASKING

De Vilbiss Co., Toledo, Ohio
Eastman Kodak Co., Rochester, N. Y.
Permacel Tape Corp., New Brunswick, N. J.
Minnesota Mining & Mfg. Co., St. Paul 6, Minn.
Seamless Rubber Co., New Haven, Conn.
Technical Tape Corp., New York 53, N. Y.
Topflight Tape Co., York, Pa.
Van Cleef Bros., Inc., 7800 S. Woodlawn Ave., Chicago 19, Ill.

TERMINALS, BATTERY

David & Co., Inc., 831 Market, Paterson 3, N. J.

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Bishop & Babcock Mfg. Co., Cleveland 14, Ohio
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*Evans Products Co., Detroit 27, Mich.
Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
Harrison Radiator Div., General Motors Corp., Lockport, N. Y.
*Minneapolis-Honeywell Regulator Co., Minneapolis 8, Minn.
*Moto-Gard Co., Raleigh, N. C.
Mu Switch Corp., Canton, Mass.
Spencer Thermostat Co., Attleboro, Mass.
Standard Thompson Co., Vandalia, Ohio
*Vapor Heating Corp., 80 E. Jackson Blvd., Chicago 4, Ill.

TICKETS and TOKENS

General Ticket Co., Nashville, Tenn.
Globe Ticket Co., Philadelphia, Pa.
*Meyer & Wenthe, Inc., 30 South Jefferson St., Chicago 6, Ill.
Rand McNally & Co., 536 S. Clark St., Chicago, Ill.

Waterbury Cos., Inc., Waterbury, Conn.

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Cooper Tire & Rubber Corp., Finlay, Ohio
Dayton Rubber Mfg. Co., Dayton, Ohio
Dunlop Tire & Rubber Co., Buffalo, N. Y.
*Firestone Tire & Rubber Co., Akron, Ohio
Fisk Rubber Co., Chicopee Falls, Mass.
*General Tire & Rubber Co., Akron, Ohio
*Goodyear Tire & Rubber Co., Akron, Ohio
*Goodrich Co., B. F., Akron, Ohio
Kelly-Springfield Tire Co., Cumberland, Md.
Laher Tire & Rubber Co., 2619 Magnolia St., Oakland, Calif.
Lee Tire & Rubber Co., Conshohocken, Pa.
Mansfield Tire & Rubber Co., Mansfield, Ohio
McCreary Tire Co., Indiana, Pa.
Mohawk Rubber Co., Akron, Ohio
Pennsylvania Rubber Co., Mansfield, Ohio
Polson Rubber Co., Garrettsville, Ohio
Seiberling Rubber Co., Barberton, Ohio
*U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.

TIRE CORD

*American Rayon Institute, 350 Fifth Ave., New York 1, N. Y.
E. I. Du Pont de Nemours & Co., Wilmington, Del.

TOILET & WASHROOM FACILITIES

*Colonna Angelo, Westmoreland & Boudinot Sts., Phila. 34, Pa.

TRANSMISSIONS—See Gears, Transmission

TRANSMISSION SERVICE—AUTOMATIC

*Trans-Main Corp, Kent, Ohio

TUBING, FLEXIBLE METALLIC

*Aeroquip Corp., Jackson, Mich.
American Metal Hose Branch, American Brass Co., Waterbury, Conn.
Belden Mfg. Co., Chicago, Ill.
Bendix-Eclipse, Teterboro, N. J.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Metal Hose Corp., 1315 S. Third Ave., Maywood, Ill.
Flex-O-Tube Co., Detroit 16, Mich.
Flexible Metal Hose Co., Chicago, Ill.
Pennsylvania Flexible Metallic Tubing Co., Philadelphia 42, Pa.
Resistoflex Corp., Belleville, N. J.
Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N. Y.
Titeflex, Inc., Newark, N. Y.
Weatherhead Co., Ft. Wayne, Ind.

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American Brass Co., Waterbury, Conn.
American Tube Bending Co., New Haven, Conn.
Bendix-Eclipse, Teterboro, N. J.
Chase Brass & Copper Co., Waterburg 91, Conn.
DeVilbiss Spray Sys., Toledo, Ohio
Ilsco Copper Tube & Products Co., Cincinnati 27, Ohio
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago 7, Ill.
Parker Appliance Co., Cleveland, Ohio
Penn. Brass & Copper Co., Erie, Pa.
Resistoflex Corp., Belleville, N. J.
Weatherhead Co., Ft. Wayne, Ind.

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Ben's Uniforms, 15492 Livernois Ave. Detroit 21, Mich.
Dubois & Son, A. 17 Union Square, New York, N. Y.
*Du Pont Co., Dept. 4B, Room 2522, Wilmington, Del.
Fechheimer Bros. & Co., 4th & Pike Sts., Cincinnati, Ohio.
Frankel & Son, Louis J., 407 El Pico Blvd., Los Angeles 15, Calif.
Gelhaar Uniform Co., 1230 Grand Ave Kansas City 6, Mo.
Goldstein, Inc., Jeff, 387 Fourth Ave. New York, N. Y.
Hirsch Tyler Co., 10th & Berks Sts., Philadelphia, Pa.
Howard Uniform Co., 313 W. Baltimore St., Baltimore, Md.
Kansas City Custom Garment Co., Kansas City 6, Mo.
Lavigne, Inc., Donald S., 29 S. E. First Ave., Miami 32, Fla.
Loev Brothers, 3014 Kensington Ave., Philadelphia 34, Pa.

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UNIVERSALS—See Joints, Universal

UPHOLSTERY MATERIALS

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Blanchard Bros. & Lane, Newark, N. J.
Burlington Mills Corp., 350 Fifth Ave., New York, N. Y.
Chicopee Mfg. Corp., 40 Worth St., New York 13, N. Y.
Clad-Rex Steel Co., 4000 Vister, Denver, Colo.
Collins & Aikman Corp., 200 Madison Ave., New York, N. Y.
*du Pont de Nemours & Co., E. I., Wilmington, Delaware
Eagle-Ottawa Leather Co., Grand Haven, Mich.
Firestone Industrial Products Co., Akron, Ohio
*Firestone Rubber Co., Plastic Div., Pottstown, Pa.
General Leather Co., Newark, N. J.
*Goodrich Co., B. F., Marietta 18, Ohio
Hooper & Sons Co., W. E., Phila., Pa. Pa.
Lackawanna Leather Co., Hackettstown, N. J.
Masland Duraleather Co., Philadelphia, Pa.
Massachusetts Mohair Plush Co., 2 Park Ave., New York, N. Y.
Pantasote Co., 444 Madison Ave., New York, N. Y.
Radel Leather Mfg. Co., Newark, N. J.
Reeves Bros. Co., 54 Worth St., New York, N. Y.
Susquehanna Mills, Inc., 404 Fourth Ave., New York, N. Y.
Textileather Corp., Toledo 4, Ohio
E. F. Timme & Son, 1 Park Ave., New York, N. Y.
*U. S. Rubber Co., 1230 Sixth Ave., New York 20, N. Y.

VALVES, ENGINE

Automotive Products Corp., Cincinnati 25, Ohio
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King Quality Products Co., St. Louis, Mo.
McQuay-Norris Mfg. Co., St. Louis, Mo.
*Sealed Power Corp., Muskegon, Mich.
Thompson Products, Inc., Cleveland 3, Ohio
*Toledo Steel Products Co., Toledo 1, Ohio

VALVES, TIRE

Dill Mfg. Co., Cleveland 3, Ohio
Jenkins Bros., Inc., Bridgeport, Conn.
Lacey Webber, Kalamazoo, Mich.
*Schraeder's Son, A., Div. Scovill Mfg. Co., Brooklyn, N. Y.

VENDING—See Machines, Vending

VENTILATORS

Anemostat Corp. of Amer., 10 E. 39th St., New York, N. Y.
Cadillac Co., Coldwater, Mich.
Cincinnati Ventilating Co., Covington, Ky.
*Electric Service Mfg. Co., Philadelphia 32, Pa.
*Evans Products Co., Detroit 27, Mich.
Garland Ventilator Co., 1511 E. Hyde Park, Chicago, Ill.
Kysor Heater Co., Cadillac, Mich.
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Railway Utility Co. 2241 S. Indiana Ave., Chicago, Ill.
Schwitzer-Cummings Corp., Indianapolis, Ind.
Sturtevant Div., Westinghouse Electric Corp., Boston, Mass.

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Mill Remnants Co., 91 Mercer St., New York, N. Y.
Sanitary Institute of America, 100 W. Monroe St., Chicago, Ill.

WHEELS

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*Budd Co., The, Detroit, Mich.
*Clark Equipment Co., Buchanan, Mich.
Dayton Steel Foundry Co., Dayton, Ohio
*Gunlite Foundries Corp., Rockford, Ill.
Homan & Co., Cincinnati, Ohio
Kelsey-Hayes Wheel Co., Detroit, Mich.
Motor Wheel Corp., Lansing, Mich.
Permold Co., Medina, Ohio

WINDOWS—See Sash, Window

WIPERS, WINDSHIELD

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American Bosch Corp., Springfield, Mass.
Anderson Co., Gary, Ind.
*Electric Auto-Lite Co., Toledo, Ohio
Hays Corp., Michigan City, Ind.
Monroe-Acme Co., 215 N. Aberdeen St., Chicago, Ill.
*National Pneumatic Co., Graybar Bldg., New York 17, N. Y.
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Engelhard, Inc., Chas., Newark, N. J.
Gow-Mac Instrument Co., Newark, N. J.
King Elec. Co., Cleveland, Ohio
Moto Meter Gauge & Equipment Div., *Electric Auto-Lite Co., Chrysler Bldg., New York 17, N. Y.
Precision Industries, Inc., Seattle, Wash.
Schauer Mfg., Cincinnati, Ohio
Weidenhoff, Inc., Jos., Chicago, Ill.

BLOWERS, VENTILATING—See Fans and Blowers

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Stow Mfg. Co., Binghamton, N. Y.
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Fuller Brush Co., Hartford, Conn.
Kansas City Brush Co., Kansas City, Mo.
Laitner Brush Co., Detroit 26, Mich.
Milwaukee Dustless Brush Co., Milwaukee, Wis.
Osborn Mfg. Co., Cleveland, Ohio
Rapids Products Co., Cedar Rapids, Iowa
*Ross & White Co., 400 W. Madison, Chicago 6, Ill.
Thomas Fountain Brush Co., Nashville 6, Tenn.
Wilson Imperial Co., Newark, N. J.
Wolfe Brush Co., Pittsburgh, Pa.
Zimmerman Brush Works, Chicago 5, Ill.

CHARGERS, BATTERY

Allen Elec. & Equip. Co., Kalamazoo, Mich.
Baldor Electric Co., St. Louis 10, Mo.
Bean Mfg. Co., John, Lansing, Mich.
Benwood-Linze Co., St. Louis, Mo.
Blitz Electric, Chicago, Ill.
Electric Heat Control Co., Cleveland 5, Ohio
Electronic Laboratories, Inc., Indianapolis 4, Ind.
*Electric Storage Battery Co., Philadelphia, Pa.
General Electric Co., Bridgeport, Conn.
Hobart Brothers, Troy, Ohio
Lanagan & Hoke, Philadelphia, Pa.
Lee Co., K. O., Aberdeen, S. D.
Marquette Mfg. Co., Minneapolis 14, Minnesota.
McColpin-Christie Corp., 3410 W. 67th St., Los Angeles, Calif.
Mercury Corp., Kansas City, Mo.
Schauer Mfg. Co., Rossmoyne, Ohio
Weidenhoff, Inc., Jos., Ft. Wayne, Ind.
*Willard Storage Battery Co., Cleveland 1, Ohio

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Bean Mfg. Co., John, Lansing, Mich.
Binks Mfg. Co., 3124 Carroll Ave., Chicago, Ill.
Brunner Mfg. Co., Utica 1, N. Y.
Champion Pneumatic Machy. Co., Princeton, Ill.
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Curtis Pneumatic Mchy., Div. Curtis Mfg. Co., St. Louis 20, Mo.
Davey Compressor Co., Kent, Ohio
De Vilbiss Co., Toledo 1, Ohio
Hardie Mfg. Co., Hudson, Mich.
Imperial-Cantrell Mfg. Co., Jellico, Tenn.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Kellogg Div. American Brake Shoe & Fdy. Co., Rochester, N. Y.
Lynch Air Compressor Co., Anderson, Ind.
*Midland Steel Products Co., Detroit, Mich.
Quincy Compressor Co., Quincy, Ill.
U. S. Air Compressor Co., Cleveland 5, Ohio
Wayne Pump Co., Salisbury, Md.
*Weaver Mfg. Co., Springfield, Ill.
*Westinghouse Air Brake Co., Wilmerding, Pa.
Wilson, K. R., Arcade, N. Y.
Worthington Pump & Machy. Corp., Harrison, N. J.

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David Round & Son, Cleveland 22, Ohio
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Kent-Moore Organization, Detroit, Mich.
Robbins & Meyers Co., Springfield, Ohio
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Silent Hoist & Crane Co., Brooklyn 20, N. Y.
*Weaver Mfg. Co., Springfield, Ill.
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Truscon Steel Co., Youngstown 1, Ohio

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Black & Decker Mfg. Co., Towson, Md.
Cummins Portable Tools, 4740 N. Ravenswood Ave., Chicago 40, Ill.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Mall Tool Co., 7737 S. Chicago Ave., Chicago 19, Ill.
Millers Falls Co., Greenfield, Mass.
Skil Corp., 5031 Elston Ave., Chicago, Ill.
*Snap-On Tools Corp., Kenosha, Wis.
Stanley Tools, New Britain, Conn.
Thor Power Tool Co., Aurora, Ill.
U. S. Electrical Tool Co., Cincinnati, Ohio
Van Dorn Elec. Tool Co., Towson, Md.

DYNAMOMETERS, ENGINE TESTING

Chatillon & Sons, John, 85 Cliff St., New York 7, N. Y.
Clayton Mfg. Co., 1363 Ellis Lane, El Monte, Calif.
Taylor Dynamometer Co., Milwaukee, Wis.

Continued on next page

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Schwitzer-Cummins Co., Indianapolis, Ind.
Sturtevant Div., Westinghouse Elec. Corp., Boston 36, Mass.
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Storm Mfg. Co., Minneapolis, Minn.
Sunnen Products Co., St. Louis, Mo.
Taft-Pierce Mfg. Co., Woonsocket, R. I.

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Hoyt-Beardsley Mfg. Co., Sioux City, Iowa
Trowbridge Auto Radiator Co., Cambridge, N. J
Warner-Patterson, Chicago, Ill.

GAGES, TIRE

Acme Air Appliance Co., Brooklyn, N. Y.
Barmotive Products, Inc., San Leandro, Calif.
Brunner Mfg. Co., Utica 1, N. Y.
Diamond-U Products, 8459 Dearborn, South Gate, Calif.
Dill Mfg. Co., Cleveland 8, Ohio
Druge Bros. Mfg. Co., Oakland, Calif.
*Schrader's Son, A., Div. Scovill Mfg. Co., Brooklyn, N. Y.
Service Station Eqpt. Co., Muskegon, Mich.
Stewart-Warner Corp., Chicago, Ill.
U. S. Gage Co., 14 Wall St., New York 5, N. Y.

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Bennett Feragen, Inc., South Bend, Ind.
Duby Co., John F., Dorchester, Mass.
Hunter Engrg. Co., St. Louis, Mo.
Lee Co., K. O., Aberdeen, S. D.
Manbee Equipment Co., 185 N. Wabash, Chicago, Ill.
Motor Wheel Corp., Lansing, Mich.
*Snap-On Tools Corp., Kenosha, Wis.
Speedmaster Co., Des Plaines, Ill.
Testing Apparatus, Inc., Detroit, Mich.
*Weaver Mfg. Co., Springfield, Ill.

GAGES and MICROMETERS

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Brown & Sharpe Mfg. Co., Providence, R. I.
Central Tool Co., Cranston, R. I.
Federal Products Corp., Providence, R. I.
Millers Falls Co., Greenfield, Mass.
Plomb Tool Co., Los Angeles 54, Calif.
Pratt & Whitney, Div. Niles-Bement-Pond Co., Hartford, Conn.
Slocomb Co., J. T., Providence, R. I.
*Snap-On Tools Corp., Kenosha, Wis.
Starrett Co., L. S., Athol, Mass.
Stewart-Warner Corp., Chicago 14, Ill.

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Baldor Electric Co., St. Louis 10, Mo.
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Canedy-Otto Mfg. Co., Chicago Heights, Ill.
Cedar Rapids Engrg. Co., Cedar Rapids, Iowa
Cincinnati Electrical Tool Co., Cincinnati, Ohio
Lee Co., K. O., Aberdeen, S. D.
Lempco Products, Inc., Bedford, Ohio
Millers Falls Co., Greenfield, Mass.
Peterson Welding Labs., Kansas City, Mo.
Simplicity Mfg. Co., Port Washington, Wis.
Skil Corp., 5031 Elston Ave., Chicago 30, Ill.
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Stanley Tools, New Britain, Conn.
Sunnen Products Co., St. Louis, Mo.
Tobin-Arp Mfg. Co., Minneapolis, Minn.
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Norton Co., Worcester 6, Mass.
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Rottler Boring Bar Co., Seattle, Wash.
Simplicity Mfg. Co., Port Washington, Wis.
Storm Mfg. Co., Minneapolis, Minn.
Sunnen Products Co., St. Louis, Mo.
Tobin-Arp Mfg. Co., Minneapolis, Minn.
Van Norman Co., Springfield, Mass.
Waterbury Tool Div., Vickers, Inc., Waterbury, Conn.

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Lisle Corp., Clarinda, Iowa
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*Snap-On Tools Corp., Kenosha, Wis.
Sunnen Products Co., St. Louis, Mo.
Van Dorn Electric Tool Co., Towson, Md.
Van Norman Co., Springfield 7, Mass.
Waterbury Tool Div., Vickers, Inc., Waterbury, Conn.

GUNS, PAINT SPRAY—See Sprayers, Paint

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*Lincoln Engrg. Co., St. Louis, Mo.
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HEATERS, HOT SPRAY—See Sprayers, Hot Paint

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Vapor Heating Corp., 80 E. Jackson Blvd., Chicago 4, Ill.

HOISTS—See Cranes and Hoists—also Lifts

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Kent-Moore Organization, Detroit, Mich.
Manley Mfg., Div., American Chain Co., York, Pa.
Walker Mfg. Co., Racine, Wis.

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INSTRUMENTS, ELECTRICAL TESTING

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Schauer Mfg., Cincinnati, Ohio.
Sun Elec. Mfg. Co., Chicago, Ill.
Weidenhoff, Inc., Joseph, Chicago, Ill.
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*Bacharach Indust'l Inst. Co., Pittsburgh 8, Pa.
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*Blackhawk Mfg. Co., Milwaukee 1, Wis.
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Chatsworth Mfg. Co., Chatsworth, Ga.
Cleveland Pneumatic Tool Co., Cleveland 5, Ohio
Coffing Hoist Co., Danville, Ill.
Duff Norton Mfg. Co., Pittsburgh, Pa.
*Electric Service Mfg. Co., Philadelphia 32, Pa.
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Homestead Valve Co., Coraopolis, Pa.
Joyce-Cridland Co., Dayton, Ohio
Manley Mfg. Div., American Chain Co., York, Pa.
Menasco Mfg. Co., 805 S. Fernando, Burbank, Cal.
National Standard Co., Niles, Mich.
Phelps Mfg Co., 5951 Sepulveda, Van Nuys, Calif.
Reliable Jack Div., Dayton Malleable Iron Co., Dayton 1, Ohio
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*Weaver Mfg. Co., Springfield, Ill.
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Brown & Sharpe Mfg. Co., Providence, R. I.
Hendly Machine Co., Torrington, Conn.
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Rockford Machine Tool Co., Rockford, Ill.
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South Bend Lathe Works, South Bend, Ind.

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Bean Mfg. Co., John, Lansing, Mich.
Chicago Rivet & Machine Co., Bellwood
Barrett Equipment Co., St. Louis, Mo.
Van Dorn Elec. Tool Co., Towson, Md.
Ill.
Strand & Co., N. A., 5001 N. Wolcott, Chicago, Ill.
Lempco Products, Inc., Bedford, Ohio.
South Bend Lathe Wks., South Bend, Ind
Star Mach. & Tool Co. (Wadell) 201 6th St., S.E., Minneapolis, Minn.
Van Norman Co., Springfield, Mass.
Waterbury Tool Div., Vickers, Inc., Waterbury, Conn.

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Bay Mfg. Co., P. O. Box 608, Harbor City, Calif.
Curtis Pneumatic Mchy., Div., Curtis Mfg Co., St. Louis 20, Mo.
Globe Hoist Co., Philadelphia 18, Pa.
Joyce-Cridland Co., Dayton 3, Ohio
Manley Mfg. Div., American Chain Co., York, Pa.
Rotary Lift Co., Memphis, Tenn.
Walker Mfg. Co., Racine, Wis.
Wayne Pump, Ft. Wayne
*Weaver Mfg. Co., Springfield, Mass.
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Whiting Corp., Harvey, Ill.
Wilson, K. R., Arcade, N. Y.

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Black & Decker Mfg. Co., Towson, Md.
Carborundum Co., Niagara Falls, N. Y.
Detroit Surfacing Mach. Co., Detroit 4, Mich.
Haskins Co., R. G., 2750 W. Flournoy St., Chicago 12, Ill.
Mall Tool Co., 7740 S. Chicago Ave., Chicago 19, Ill.

Pratt & Whitney, Div. Niles-Bement-Pond Co., Hartford, Conn.
*Snap-On Tools Corp., Kenosha, Wis.
Skil Corp., 5031 Elston Ave., Chicago 30, Ill.

MACHINES, WHEEL ALIGNING — See GAGES, WHEEL ALIGNING

MACHINES, WHEEL BALANCING

Bean Mfg. Co., John, 1305 S. Cedar St., Lansing, Mich.
Bear Mfg. Co., 21st St. & Fifth Ave., Rock Island, Ill.
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Bennett-Feragen, South Bend, Ind.
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Hunter Engrg. Co., St. Louis, Mo.
Merrill Engineering, 1240 Lincoln St., Denver 3, Colo.
Stewart-Warner Corp., 1826 Diversey Parkway, Chicago, Ill.
Sunstrand Tool Co., Rockford, Ill.
*Weaver Mfg. Co., 2177 S. Ninth St., Springfield, Ill.

MICROMETERS—See Gages and Micrometers

PARTS-WASHING, EQUIPMENT for

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Blakeslee & Co., G. S., 1844 S. 52nd St., Chicago 50, Ill.
Circo Eqpt. Co., Clark Twshp., N. J.
Clayton Mfg. Co., (Kerrick), Alhambra, Calif.
Detrex Corp., Detroit, Mich.
Grinnell Co., Providence 1, R. I.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Gray-Mills Co., Evanston, Ill.
Hydra Lectric Prod. Co., Indianapolis, Ind.
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*Magnus Chemical Co., Garwood, N. J.
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Practical Products Co., Minneapolis 8, Minn.
Protectoseal Co., Chicago, Ill.
Roth Mfg. Co., 1600 S. Kilbourn Ave., Chicago, Ill.
Siebring Mfg. Co., George, Iowa
Whiting Corp., Harvey, Ill.

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Greenerd Arbor Press Co., Nashua, N. H.
Lempco Products, Inc., Bedford, Ohio
Manley Mfg. Div., American Chain Co., York, Pa.
*Weaver Mfg. Co., Springfield, Ill.
Wilson, K. R., Arcade, N. Y.

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Bear Mfg. Co., Rock Island, Ill.
Cole-Hersee Co., Boston, Mass.
Crane Puller Co., Waltham, Mass.
Greb Co., Stoughton, Mass.
National Machine & Tool Co., 4077 Page St., Jackson, Mich.
*Snap-On Tools Corp., Kenosha, Wis.
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Aqua Systems, Inc., 385 Gerard Ave., New York 51, N. Y.
Bennett Pump Div., John Wood Co., Muskegon, Mich.
Bowser, Inc., Fort Wayne 2, Ind.
Dayton Pump, Dayton, Ohio
Erie Meter Systems, Inc., Erie, Pa.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Liquidometer Corp., Long Island City, N. Y.
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Service Station Equipment Co., Muskegon, Mich.
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Tokheim Oil Tank & Pump Co., Fort Wayne, Ind.
Wayne Pump Co., Salisbury, Md.
Yale & Towne Mfg. Co., Stamford, Conn.

REAMERS—See Taps, Dies, Reamers, Etc.

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*Luber-Finer, Inc., Los Angeles 7, Calif.
Oil Purifier, Inc., Oakland, Calif.
Skinner Purifiers, Inc., Detroit, Mich.
Youngstown Miller Co., Bellville, N. J.

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Kent-Moore Organization, Detroit, Mich.
Shaler Co., Waupun, Wis.
Stackhouse, E. H., Philadelphia, Pa.
Vanderbilt-Osborne Corp., Newark, N. J.

SANDERS—See Machines, Sanding and Polishing

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Berger Div., Republic Steel Corp., Canton, Ohio
Bernard-Franklin Co., Inc., 2966 E. Hedley, Philadelphia 37, Pa.
Darby & Son, E. J., Philadelphia, Pa.
*Electric Service Mfg. Co., Philadelphia 32, Pa.
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Lyon Metal Products, Inc., Aurora, Ill.
National Scale Co., Chicopee Falls, Mass.
Penn Metal Corp., Philadelphia, Pa.
*Snap-On Tools Corp., Kenosha, Wis.
Standard Pressed Steel Co., Jenkintown, Pa.
Stackbin Corp., Olneyville, R. I.
Superior Mfg. Co., Winston-Salem, N. C.

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Metallizing Engineering Co., Long Island City, N. Y.
Metallizing Co. of America, 1330 W. Congress St., Chicago, Ill.

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Crown Spray Gun Mfg. Co., Los Angeles, Calif.
Curtis Pneumatic Mchy., Div. Curtis Mfg. Co., St. Louis 20, Mo.
Decora Mfg. Co., Berkeley, Calif.
DeVilbiss Co., Toledo 1, Ohio
Eclipse Air Brush Co., Newark, N. J.
Electric Sprayit Co., Sheboygan, Wis.
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M & G Mfg., Indianapolis, Ind.
Master Mfg. Co., 811 W. Cabrini St., Chicago 7, Ill.
Metal Specialties Mfg. Co., 3200 W. Carroll Ave., Chicago, Ill.
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Wilson, K. R., Arcade, N. Y.

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Spee-Flo Co., The, 3603 Harrisburg Blvd., Houston, Texas
Thermalcup, Inc., Cleveland, Ohio

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*Bacharach Indust'l Inst. Co., Pittsburgh 8, Pa.
Continental Sales Corp., Columbus, Ind.
Kent-Moore Organization, Detroit, Mich.
*Weaver Mfg. Co., Springfield, Ill.

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Greenfield Tap & Die Corp., Greenfield, Mass.
*Heli-Coil Corp., Danbury, Conn.
Keystone Reamer & Tool Co., Millersburg, Pa.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
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Kent-Moore Organization, Detroit, Mich.
Landis Tool, Inc., Waynesboro, Pa.
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Taft-Pierce Mfg. Co., Woonsocket, R. I.
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Fostoria Pressed Steel Corp., Fostoria, Ohio
*Heli-Coil Corp., Danbury, Conn.
Herbrand Corp., Fremont, Ohio
Indestro Mfg. Co., Chicago, Ill.
Ingersoll Rand Co., 11 Broadway, New York, N. Y.
Ken-Tool Mfg. Co., Akron, Ohio
K-D Mfg. Co., Lancaster, Pa.
Lee Co., K. O., Aberdeen, S. D.
Mall Tool Co., 7740 S. Chicago Ave., Chicago, Ill.
New Britain Mach. Co., New Britain, Conn.
Owatonna Tool Co., Owatonna, Minn.
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*P & G Mfg. Co., 305 N.E. Russell St., Portland 12, Oregon
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Proto Tools, 2209 S Santa Fe, Los Angeles
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Rinck & McIlwaine, Inc., 16 Hudson St., New York, N. Y.
*Snap-On Tools Corp., Kenosha, Wis.
Stanley Tools, New Britain, Conn.
Swallow Airplane Co., Wichita, Kan.
Tubing Appliance Co., 10321 Anza Ave., Los Angeles 45, Calif.
Van Dorn Electric Tool Co., Towson, Md.
*Weaver Mfg. Co., Springfield, Ill.
Williams Co., J. H., Buffalo 7, N. Y.
Wilson, K. R., Arcade, N. Y.

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Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Keller Tool Co., Grand Haven, Mich.
Mall Tool, Chicago, Ill.
Skil Corp., 5033 Elston Ave., Chicago 30, Ill.
Thor Power Tool Co., Aurora, Ill.
U. S. Tool Co., Ampere, N. J.

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Magnesium Co. of America, E. Chicago, Ind.

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Columbian Vise & Mfg. Co., Cleveland, Ohio
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This bus company finds way to get most miles between overhauls

Chicago & West Towns uses **STANOLUBE HD-M** *Motor Oil, gets up to 350,000 miles between major maintenance jobs*

Lawrence P. Reilly, Superintendent of Equipment, and B. J. Toale (left), Standard Oil automotive engineer, discuss bus lubrication beside Chicago & West Towns bus. Providing technical service on lubrication is work familiar to Barney Toale. He has been doing it for eighteen years. Barney is Chief Automotive Engineer in the Standard Oil Chicago division and has completed Standard's Sales Engineering School. Customers find this experience and training pay off for them.

Barney Toale and L. P. Reilly inspect engine just pulled after 350,000 miles service. Chicago & West Towns consistently gets this service from engines. Line has carefully controlled PM program, uses only STANOLUBE HD-M Motor Oil.

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Getting 350,000 miles between overhauls, as this bus operator does on some equipment, requires close attention to the PM program—and the use of a motor oil that will stand up to such severe service. STANOLUBE HD-M Motor Oil delivers this kind of service—with plenty to spare. The stop and go of bus operations in all types of weather promotes oil oxidation and the formation of varnish, sludge and carbon-like deposits on engine parts. STANOLUBE HD-M's high quality base stock and additive formula render it impervious to oxidation even under the most severe operations. Detergent-dispersant properties keep engine parts free of deposits.

At the same time STANOLUBE HD-M Motor Oil provides Chicago & West Towns with another important advantage. By using this one motor oil for both gasoline and diesel equipment the bus company has cut inventories, saved on storage facilities and space and eliminated chances for application mistakes.

STANOLUBE HD-M Motor Oil can help you get better performance for your equipment just as it is doing for Chicago & West Towns. Find out. A Standard Oil automotive lubrication specialist is nearby in any of the 15 Midwest and Rocky Mountain states. Call him. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Quick Facts About **STANOLUBE HD-M Motor Oil**

1. **STANOLUBE HD-M Motor Oil is refined from high quality, solvent extracted base stocks.**
2. **STANOLUBE HD-M contains specialized additives that prevent bearing corrosion, reduce piston varnish and keep rings free to seal against blow-by.**
3. **STANOLUBE HD-M contains still other additives that reduce wear and prevent damage to cams and tappets and other heavily stressed parts.**

STANDARD

STANDARD OIL COMPANY
(Indiana)